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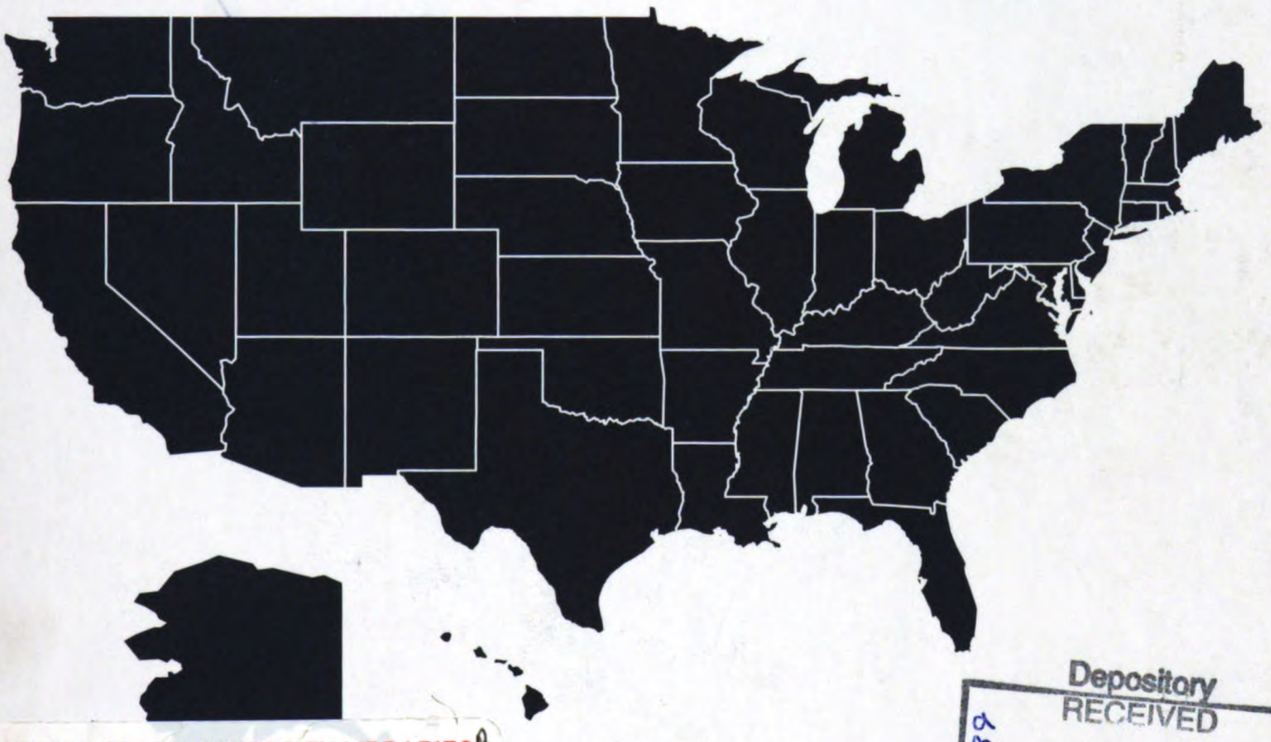
U.S. Department of the Interior
U.S. Geological Survey

MINERALS YEARBOOK 2009

Area Reports: Domestic 2009

Volume II



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U.S. DEPARTMENT OF THE INTERIOR
SALLY JEWELL, Secretary

U.S. GEOLOGICAL SURVEY
Suzette M. Kimball, Acting Director

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Foreword

This edition of the U.S. Geological Survey (USGS) Minerals Yearbook discusses the performance of the worldwide minerals and materials industries during 2009 and provides background information to assist in interpreting that performance. Content of the individual Minerals Yearbook volumes follows:

- Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Chapters on survey methods, summary statistics for domestic nonfuel minerals, and trends in mining and quarrying in the metals and industrial mineral industries in the United States are also included.
- Volume II, Area Reports: Domestic, contains a chapter on the mineral industry of each of the 50 States and Puerto Rico and the Administered Islands. This volume also has chapters on survey methods and summary statistics of domestic nonfuel minerals.
- Volume III, Area Reports: International, is published as four separate reports. These regional reports contain the latest available minerals data on more than 180 foreign countries and discuss the importance of minerals to the economies of these nations and the United States. Each report begins with an overview of the region's mineral industries during the year. It continues with individual country chapters that examine the mining, refining, processing, and use of minerals in each country of the region and how each country's mineral industry relates to U.S. industry. Most chapters include production tables and industry structure tables, information about Government policies and programs that affect the country's mineral industry, and an outlook section.

The USGS continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the Minerals Yearbook are welcomed.

Suzette M. Kimball, Acting Director

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Contacts

Information about the U.S. Geological Survey, its programs, staff, and products may be accessed on the Internet at http://www.usgs.gov or by contacting the Earth Science Information Center at 1–888–ASK–USGS. For specific information about this publication, contact the Center secretary at (703) 648–4961. Additional minerals information may be accessed on the Internet at http://minerals.usgs.gov/minerals.

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Acknowledgments

This volume was produced by Michael S. Baker, Physical Scientist; Florence C. Katrivanos, Geologist; Yadira Soto-Viruet, Research Associate; and Spencer Buteyn, Physical Science Technician, with the National Minerals Information Center of the U.S. Geological Survey (USGS). Domestic nonfuel mineral production data and tables were prepared by Joseph M. Krisanda, Industry Data Analyst; construction sand and gravel and crushed stone data and tables were prepared by Martha L. Jackson, Hodan A. Fatah, and Forrest Morgan, Statistical Assistants. State mineral commodity rankings and statistical analyses were performed by Mr. Baker, Ms. Katrivanos, Ms. Soto-Viruet, and Mr. Buteyn, and were based upon data reported to the USGS by companies responding to the annual canvasses of nonfuel mineral producers in the United States. For crushed stone and construction sand and gravel, each State chapter includes tabular 2008–09 data in more detail (kind of stone, use, by aggregate district, and so forth), where applicable. The State maps, placed opposite the first page of the appropriate State chapter, were extensively updated and revised by Robert M. Callaghan, Physical Scientist, in collaboration with USGS mineral commodity specialists, State Geological Surveys, State minerals information agencies, and various other Federal Government agencies.

Compilations of data contained in this volume were largely based on statistics and other data provided by the mineral industries. The USGS gratefully acknowledges the willing contribution of these essential data by both companies and individuals. Information regarding a State's mining industry, mineral exploration, and other mining-related activities or legislation was derived from information submitted by officials from participating States. Authors of text submissions from participating States are referenced by a footnote in each chapter, as appropriate. We thank those State agencies that contributed mining and minerals industry information for their States. Their submissions significantly broadened the scope of those chapters; their participation in this joint project is greatly appreciated.

All chapters underwent technical review by USGS mineral commodity specialists and other agency professionals. The combination of their knowledge and expertise into this project was invaluable in producing accurate State reports and tables and is also greatly appreciated. State maps indicating "principal producing areas" lead off each respective chapter; a Map Mineral Symbols list is included that has in one place all of the mineral symbols used in these maps.

In the collection of statistical and other mineral industry information, the USGS also was assisted by various State agencies through cooperative memoranda of understanding (MOUs). Some of the chapters in this publication were prepared or reviewed by staff members of these State agencies. Our sincere appreciation for all agency cooperation is extended to each State and Commonwealth government agency that has an MOU with the USGS. These are as follows:

Alabama: Geological Survey of Alabama.
Arizona: Arizona Geological Survey.
Arkansas: Arkansas Geological Survey.
California: California Geological Survey.
Colorado: Colorado Geological Survey.
Connecticut: Connecticut Geological and Natural History Survey.
Delaware: Delaware Geological Survey.
Florida: Florida Geological Survey.
Idaho: Idaho Geological Survey.
Illinois: Illinois State Geological Survey.
Indiana: Indiana Geological Survey.
Iowa: Iowa Geological and Water Survey.
Kansas: Kansas Geological Survey.
Kentucky: Kentucky Geological Survey.
Maine: Maine Geological Survey.
Maryland: Maryland Department of the Environment, Mining Program, Minerals, Oil and Gas Division.
Massachusetts: Office of the Massachusetts State Geologist, Commonwealth of Massachusetts.
Michigan: Michigan Department of Environmental Quality, Office of Oil, Gas, and Minerals.
Mississippi: Mississippi Department of Environmental Quality, Office of Geology.
Missouri: Missouri Department of Natural Resources, Division of Geology and Land Survey.
Montana: Montana Bureau of Mines and Geology.
Nebraska: University of Nebraska-Lincoln, Nebraska Conservation and Survey Division.
Nevada: Nevada Bureau of Mines and Geology.
New Hampshire: New Hampshire Geological Survey.
New Jersey: New Jersey Geological Survey.
New Mexico: New Mexico Bureau of Geology and Mineral Resources.

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New York: New York State Geological Survey.
North Carolina: North Carolina Geological Survey.
North Dakota: North Dakota Geological Survey.
Ohio: Ohio Department of Natural Resources, Division of Geological Survey.
Oklahoma: Oklahoma Geological Survey.
Oregon: Oregon Department of Geology and Mineral Industries.
Pennsylvania: Pennsylvania Bureau of Topographic and Geologic Survey.
Rhode Island: Rhode Island Geological Survey.
South Carolina: South Carolina Geological Survey.
South Dakota: South Dakota Geological Survey.
Tennessee: Tennessee Department of Environment and Conservation, Division of Geology.
Texas: The University of Texas at Austin, Bureau of Economic Geology.
Utah: Utah Geological Survey.
Vermont: Vermont Geological Survey.
Virginia: Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources.
Washington: Washington State Department of Natural Resources, Division of Geology and Earth Resources.
West Virginia: West Virginia Geological and Economic Survey.
Wisconsin: Wisconsin Geological and Natural History Survey.
Wyoming: Wyoming State Geological Survey.

The staff of the National Minerals Information Center gratefully acknowledges the invaluable contributions that John H. DeYoung, Jr., has made to the quality of the Minerals Yearbook during his tenure as the Director of the National Minerals Information Center from January 1996 until June 2013.

Steven M. Fortier
Director, National Minerals Information Center

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Survey Methods for Nonfuel Minerals

By Jeffrey P. Busse

The U.S. Geological Survey (USGS) collects worldwide data on virtually every commercially important nonfuel mineral commodity. These data form the basis for tracking and assessing the health of the minerals sector of the U.S. economy.

The USGS data collection activity was instituted by the 47th Congress in the appropriations act of August 7, 1882 (22 Stat. 329), which placed the collection of mineral statistics on an annual basis. The most recent authority for the USGS survey activity is the National Materials and Minerals Policy, Research and Development Act of 1980 (Public Law 96–479, 94 Stat. 2305). The Act included provisions to strengthen protection for proprietary data provided to the U.S. Department of the Interior by persons or firms engaged in any phase of mineral or mineral-material production or consumption.

Data Collection Surveys

The USGS begins the collection of domestic nonfuel minerals and materials statistics by appraising the information requirements of government and private organizations of the United States. Requirements that can be met by collecting data from minerals establishments are posed as questions on USGS surveys. Figure 1 shows a typical survey form.

Specific questions about mineral commodity activities, such as production, shipments, consumption, and recycling are structured in the survey forms to provide meaningful aggregated data. Thus, the entire mineral economic cycle from exploration and production through recycling is covered by approximately 150 monthly, quarterly, semiannual, and annual surveys.

After the survey form has been designed, a list of the appropriate establishments to be canvassed is developed. Many sources are used to determine which companies, mines, plants, and other operations are included on the survey mailing list. State geologists, Federal organizations (such as the Mine Safety and Health Administration), trade associations, industry representatives, and trade publications and directories are some of the sources that are used to develop and update survey listings. With few exceptions, a complete census of the list of establishments is used rather than a sample survey.

The Paperwork Reduction Act requires that any Government agency that wants to collect information from 10 or more individuals or establishments must first obtain approval from the Office of Management and Budget (OMB), which approves the need to collect the data and protects industry from unwarranted Government paperwork. This approval is indicated by the OMB control number on the survey forms (figure 1).

Survey Processing

The USGS surveys approximately 20,000 establishments. Each year, the USGS mails about 32,000 forms for approximately 150 different surveys. Each completed survey form returned to the USGS undergoes extensive analysis, including computerized checks, to ensure the highest possible accuracy of the mineral data. The statistical staff monitors all surveys to ensure that errors are not created by reporting in physical units different from the units requested on the form. Relations between associated measures, such as produced crude ore and marketable crude ore, are analyzed for consistency. Engineering variables, such as recovery factors from ores and concentrates, also are used. The totals for each form are verified, and currently reported data are checked against prior reports to detect possible errors or omissions.

The USGS has developed a Web-based electronic forms system as required by the Government Paperwork Elimination Act (GPEA). This electronic system was designed to speed the collection and analysis of minerals information. As of December 2009, approximately 100 canvass forms, accounting for all the annual responses covered by GPEA, are available electronically.

Survey Responses.—To enable the reader to better understand the basis on which the statistics are calculated, each mineral commodity chapter includes a section about domestic data coverage. This section briefly describes the data sources, the number of establishments surveyed, the response percentage, and the method of estimating the production or consumption for nonrespondents.

To produce reliable aggregated data, the USGS uses efficient procedures for handling instances of nonresponse. Failure to respond to the initial survey form results in a second request, in the form of either a second mailing of the paper form or an email in the case of electronic respondents. If the second request does not produce a response, then telephone calls are made to the nonrespondents. The followup calls provide the necessary data to complete the survey forms and/or to verify questionable data entries. Periodic visits to mineral establishments also are made by USGS mineral commodity specialists to gather missing data and to explain the importance of the establishment's reporting. By describing the use of the published statistics and showing the impact of nonresponse, the USGS strives to encourage respondents to give complete and accurate replies.

The OMB publication "Guidelines for Reducing Reporting Burden" stipulates that the minimum acceptable response rate is 75% of the panel surveyed. In addition, the USGS strives for a minimum reporting level of 75% of the quantity produced or consumed (depending on the survey) for certain key statistics. Response rates are periodically reviewed. For those surveys that do not meet the minimum reporting level, procedures are developed and implemented to improve response rates.

Estimation for Nonresponse.—When efforts to obtain a response to a survey fail, estimation or imputation techniques must be used to account for missing data. Some of the estimation methods depend on knowledge of prior establishment reporting; other techniques rely on external information to estimate the missing data. When survey forms are received after the current publication has been completed, the forms are reviewed, necessary imputations are made for missing data, and the survey database is updated. The revised data are reported in later publications.

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Protection of Proprietary Data.—The USGS relies on the cooperation of the U.S. minerals industry to provide the minerals data that are presented in this and other USGS minerals information publications. Without a strong response to survey requests, the USGS would not be able to present reliable statistics. The USGS, in turn, respects the proprietary nature of the data received from the individual companies and establishments. To ensure that proprietary rights will not be violated, the USGS analyzes each of the aggregated statistics to determine if the data reported by an individual establishment can be deduced from the aggregated statistics. If, for example, there are only two significant producers of a mineral commodity in a given State, then the USGS will not publish the State total because either producer could readily estimate the production of the other. It is this obligation to protect proprietary information that results in the withheld entries indicated with the symbol "W" in the published tables. If a company gives permission in writing, however, then the USGS will publish the data as long as the data from other respondents are protected from disclosure.

International Data

International data are collected by USGS country specialists and international data coordinators. The data are gathered from various sources, which include published reports of foreign Government mineral and statistical agencies, international organizations, the U.S. Department of State, the United Nations, the Organization of the Petroleum Exporting Countries, and personal contact by specialists traveling abroad. Each February, minerals questionnaires requesting estimates of mineral production for the country for the preceding year are sent to foreign organizations. Missing data are estimated by USGS country specialists on the basis of historical trends and the specialist's knowledge of current production capabilities in each country.

Publications

The USGS disseminates current and historical minerals information through printed publications and its Web site.

Printed Publications.—The Minerals Yearbook summarizes annually, on a calendar-year basis, the significant economic and technical developments in the mineral industries. Three volumes are issued each year—volume I, Metals and Minerals; volume II, Area Reports: Domestic; and volume III, Area Reports: International. Volume I presents, by mineral commodity, salient statistics on production, trade, consumption, and other measures of economic activity. Volume II reviews the U.S. minerals industry by State and island possessions. Volume III is published as four separate regional reports that cover more than 175 foreign countries; these reports contain individual country chapters that examine the mining, refining, processing, and use of minerals in each country in the region and how they relate to U.S. industry. Volume III chapters also contain information on fuels.

The Mineral Commodity Summaries (MCS), which is an up-to-date summary of more than 90 individual minerals and materials, is the earliest Government publication to furnish estimates that cover the previous year's nonfuel mineral industry data. It contains information on the domestic industry structure, Government programs, tariffs, 5-year salient domestic statistics, and a summary of significant events, trends, and issues in the domestic and international minerals industry during the past year.

The Minerals Yearbook and the MCS may be purchased by mail from the U.S. Government Printing Office, P.O. Box 979050, St. Louis, MO 63197-9000; telephone, (202) 512-1800 or (866) 512-1800 (toll-free); Internet, http://bookstore.gpo.gov.

Electronic Publications.—Current and historical minerals information is available through the USGS Web site at http://minerals.usgs.gov/minerals/. The Web site provides USGS minerals information products as well as USGS contacts for minerals information and links to other mineral-related sites on the Internet.

Mineral Industry Surveys (MISs) contain timely statistical and economic data on minerals. The surveys are designed to keep government agencies and the public, particularly the mineral industry and the business community, informed of trends in the production, distribution, inventories, and consumption of minerals. Frequency of issue depends on the demand for current data. MISs are released monthly, quarterly, or annually.

The Metal Industry Indicators (MII) report, which is published monthly, contains indexes that measure the current and future performance of three U.S. metal industries. For each of the three industries, a composite coincident index and a composite leading index have been developed based on procedures and data similar to those used to construct The Conference Board's coincident and leading cyclical indexes for the national economy. MIIs also contain several indicators for metal prices. Nonmetallic Mineral Products Industry Indexes, also published monthly, contains leading and coincident indexes that measure the current and future performance of the industrial minerals industry. The indexes were designed by using the same procedures as the USGS metal composite indexes.

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FIGURE 1
A TYPICAL SURVEY FORM

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Collection of nonfuel minerals information is authorized by Public Law 96-479 and the Defense Production Act. This information is used to support executive policy decisions pertaining to emergency preparedness, national defense, and analyses for minerals legislation and industrial trends. The USGS relies on your voluntary and timely response to assure that its information is complete and accurate.

Please return this form in the enclosed envelope or fax to the above toll-free number by the **15TH OF THE MONTH** following the reporting period. Complete a separate form for each mineral establishment that was active during the reporting period. A mineral establishment is defined as a single physical location where mineral operations are conducted; for example, a mine only, a mine and preparation plant, or a preparation plant only. If you do not have exact data, please enter your best estimates and mark with an /e. Use zero (0) when appropriate. Do not report decimals or fractions. Round to the nearest whole number. If you have nothing to report, please complete Section 1, sign, and return the form. Please use the space for "Remarks" to provide any specific information that will help us in the use or interpretation of the data. Any statement on the effect of changes in economic conditions upon the reporting establishment will be useful. Additional forms are available upon request.

If you have any questions concerning completion of this form, please contact the Mineral Commodities Data Unit, U.S. Geological Survey, 985 National Center, Reston, VA 20192, Telephone (703) 648-7960.

SECTION 1. Mine or group covered by this report.

Name _____ State _____ County _____

SECTION 2. Stocks, production, and shipments of usable ore for the report month.
Report only ore products as shipped to consumer, such as direct-shipping ore, concentrate, or agglomerates.
Report ores produced in the United States only; do not include imports.

Usable ore (1)	Code	Weight unit Mark (X) one (2) Long tons (4)	Weight unit Mark (X) one (2) Metric tons (6)	Physical inventory Adjustment only (3)	Beginning stocks (4)	Production (5)	Shipments (6)	Ending stocks (7)
Iron ore (containing less than 5% Mn, natural).....	201							

SECTION 3. Please indicate any mines opened or closed by your company during the month.

Remarks:

Name of person to be contacted regarding this report			Tel. area code	No.	Ext.
Address	No.	Street	City	State	ZIP Code

May tabulations be published which could indirectly reveal the data reported above? ☐ (1) Yes ☐ (2) No

Signature	Title	Date

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STATISTICAL SUMMARY

By Joseph M. Krisanda

The world production table was prepared by Glenn J. Wallace, international data coordinator.

This annual report summarizes data on crude nonfuel mineral production[1] for the United States, its island possessions, and the Commonwealth of Puerto Rico.

Although crude mineral production may be measured at any of several stages of extraction and processing, the stage of measurement used in this annual report is what is termed "mine output." This term refers to minerals or ores in the form in which they are first extracted from the ground, but customarily may include the output from auxiliary processing at or near the mines.

Because of inadequacies in the statistics available, some series deviate from the foregoing definition. For copper, gold, lead, silver, and zinc, the quantities listed are recorded on a mine basis (as the recoverable content of ore sold or treated). The values assigned to the quantities, however, are based on the average selling price of refined metal, not the mine value.

The total value of all nonfuel mineral production in the United States in 2009 decreased to $59.0 billion, which was a 17% decrease compared with that of 2008; metals decreased to $21.9 billion, which was a decrease of 20%; and industrial minerals decreased to $37.1 billion, a decrease of 16%.

In 2009, the value of nonfuel mineral commodity production for the following 12 mined commodities, in descending order of production value, was greater than $1 billion: stone (crushed), gold, sand and gravel (construction), copper, cement (portland), phosphate rock (marketable), molybdenum concentrates, iron ore (usable shipped), salt, lime, soda ash, and zinc. They accounted for 88% of the U.S. total production value (table 1).

In 2009, the value of nonfuel mineral commodity production in the following 17 States, in descending order of production value, was greater than $1 billion: Nevada, Arizona, Florida, Utah, California, Texas, Alaska, Minnesota, Missouri, Wyoming, Michigan, Pennsylvania, Colorado, Georgia, New York, Ohio, and Alabama. They accounted for 73% of the U.S. total production value (table 3).

---

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 U.S. Geological Survey (USGS) mineral production data published in this chapter are as of September 2011. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information is available on the Internet at http://minerals.usgs.gov/minerals/contacts/comdir.html; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). Minerals Yearbook chapters (for mineral commodities, States, and countries) and Mineral Industry Surveys are also available on the Internet at http://minerals.usgs.gov/minerals.

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TABLE 1

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
Metals:							
Beryllium concentrates[4]	metric tons	3,810	NA	4,410	NA	3,030	NA
Cadmium[e, 5]	do.	3,070	23,400	2,990	17,700	2,840	8,140
Copper[6]		1,170	8,450,000	1,310	9,200,000	1,180	6,280,000
Gold[6]	kilograms	238,000	5,350,000	233,000	6,550,000	223,000	7,000,000
Iron ore, usable shipped		50,900	3,040,000	53,600 r	3,770,000	27,600	2,560,000
Lead[6]	metric tons	434,000	1,180,000	399,000	1,060,000	395,000	757,000
Molybdenum concentrates[7]	do.	57,000	3,530,000	55,900	3,830,000	47,800	2,870,000
Palladium[6]	kilograms	12,800	148,000	11,900 r	136,000	12,700	108,000
Platinum[6]	do.	3,860	162,000	3,580 r	182,000	3,830	149,000
Silver[6]	do.	1,280,000	554,000	1,250,000	600,000	1,250,000	588,000
Zinc[6]	metric tons	769,000	2,620,000	748,000	1,470,000	710,000	1,220,000
Combined values of magnesium metal, titanium concentrates, tungsten, zirconium concentrates		XX	308,000 r	XX	518,000 r	XX	345,000
Total		XX	25,400,000	XX	27,300,000	XX	21,900,000
Industrial minerals, excluding fuels:[8]							
Barite		455	20,600	648	30,900	383	19,900
Cement:[9]							
Masonry		4,320	614,000 e	3,030	428,000 e	1,970	269,000 e
Portland		91,100	9,230,000 e	83,300	8,390,000 e	62,000	5,960,000 e
Clays:							
Ball		1,070	49,000	968	44,300	831	37,700
Bentonite		4,820	252,000	4,910 r	267,000 r	3,650	207,000
Common		20,600	216,000	17,500	202,000	12,500	156,000
Fire		565	23,800	296 r	11,800 r	320	12,000
Fuller's earth		2,600	247,000	2,340 r, 10	230,000 r, 10	2,010 10	206,000 10
Kaolin		7,110	959,000	6,740	900,000	5,290	714,000
Diatomite		687	163,000	764	171,000	575	147,000
Feldspar[9]		730 11	43,800	650 11	40,000 r	550 11	35,600
Garnet, industrial[9]	metric tons	61,400	11,300	62,900	13,600	45,600	6,850
Gemstones, natural[9]		NA	11,900	NA	11,500	NA	8,410
Gypsum, crude[9]		15,700 r	95,000 r	12,300 r	91,200 r	10,400	77,400
Helium:							
Crude	million cubic meters	40	68,900	42	90,100	40	85,700
Grade-A	do.	138	497,000	130	630,000	117	572,000
Kyanite		118	29,100	97	25,500	71	20,000
Lime		20,200	1,760,000	19,800	1,830,000	15,800	1,650,000
Mica, crude	metric tons	96,600	14,400	84,000	12,000 r	50,100	7,040
Peat		694	17,800	647	17,100	644	15,000
Perlite, crude	metric tons	409,000	18,500	434,000	20,800	348,000	17,100
Phosphate rock, marketable[9]		29,700	1,520,000	30,200	2,320,000	26,400	3,360,000
Potash, gross weight[11]		2,600	480,000	2,400	740,000	1,500	500,000
Pumice and pumicite	metric tons	1,270,000	28,900	791,000	15,900	410,000	12,300
Salt		45,500	1,520,000	47,400 r	1,690,000 r	43,100	1,750,000
Sand and gravel:							
Construction		1,250,000 r	8,820,000 r	1,060,000 r	7,900,000 r	836,000	6,330,000
Industrial		30,100	832,000	30,400	940,000 r	24,600	783,000
Silica stone[12]	metric tons	231	1,020	(13)	W	(13)	W
Soda ash[9]		11,100	1,260,000	11,300	1,520,000	9,310	1,330,000

See footnotes at end of table.

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TABLE 1—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Industrial minerals, excluding fuels—Continued:							
Stone:							
Crushed[14]		1,650,000	14,100,000	1,460,000 r	13,600,000 r	1,170,000	11,300,000
Dimension		1,920	346,000	1,800	326,000 r	1,620	328,000
Talc, crude[9]		769	24,400	706	21,800	511	14,600
Tripoli[9]	metric tons	96,400	17,400	132,000	17,100	79,700	16,400
Vermiculite, concentrate[e]		100 [15]	W	100 [15]	W	100 [15]	W
Combined values of andalusite, boron minerals, bromine, brucite (2007–08), clays [fuller's earth (2008–09)], emery (2008–09), greensand marl, iodine (crude), iron oxide pigments (crude), lithium carbonate, magnesite, magnesium compounds, olivine, pyrophyllite (crude), staurolite, wollastonite, zeolites, and values indicated by symbol W		XX	1,340,000 r	XX	1,380,000	XX	1,120,000
Total		XX	44,700,000 r	XX	44,000,000 r	XX	37,100,000
Grand total		XX	70,000,000	XX	71,300,000 r	XX	59,000,000

[e]Estimated. [r]Revised. do. Ditto. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined values."
XX Not applicable.

[1]Table includes data available through July 26, 2011.

[2]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[3]Data are rounded to no more than three significant digits; may not add to totals shown.

[4]Shipments.

[5]Byproduct from zinc concentrates.

[6]Recoverable content of ores, etc.

[7]Content of ore and concentrate.

[8]Sold or used unless otherwise specified.

[9]Production.

[10]Excludes attapulgite; included in "Combined values."

[11]Data are rounded to two significant digits.

[12]Includes grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

[13]Withheld to avoid disclosing company proprietary data.

[14]Excludes abrasive stone and bituminous limestone and sandstone; all included elsewhere in table.

[15]Data are rounded to one significant digit.

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TABLE 2

NONFUEL MINERALS PRODUCED IN THE UNITED STATES, BY COMMODITY AND STATES IN 2009[1]

(Principal States based on quantity unless otherwise noted)

Mineral	Principal States	Other States (alphabetical order)
Andalusite	NC	
Barite	NV and GA	
Beryllium concentrates	UT	
Boron	CA	
Bromine	AR	
Cement:		
Masonry	CA, IN, AL, TX, PA	AR, AZ, CO, FL, GA, IA, KS, KY, MD, ME, MI, MO, NE, NM, NY, OH, OK, SC, TN, VA, WV.
Portland	TX, CA, MO, PA, MI	All other States, except AK, CT, DE, HI, LA, MA, MN, NC, ND, NH, NJ, RI, VT, WI.
Clays:		
Ball	TN, TX, MS, KY, IN	
Bentonite	WY, MT, UT, AL, TX	AZ, CA, CO, MS, NV, OR.
Common	TX, AL, NC, OH, GA	All other States, except AK, DE, HI, ID, MN, NH, NJ, NV, OR, RI, VT, WI.
Fire	MO, CA, OH, TX, WA	CO.
Fuller's earth	GA, MO, MS, VA, CA	FL, IL, KS, NV, TN, TX.
Kaolin	GA, SC, AL, AR, NV	CA, FL, NC, TX.
Copper[2]	AZ, UT, NV, NM, MT	ID and MO.
Diatomite	CA, NV, OR, WA	
Emery	OR	
Feldspar	NC, VA, CA, ID, OK	GA and SD.
Garnet, industrial	MT, NY, ID	
Gemstones, natural[3]	AZ, OR, UT, CA, ID	All other States.
Gold[2]	NV, AK, UT, CO, WA	AZ, CA, ID, MT, NM, SD.
Greensand marl	NJ	
Gypsum, crude	OK, IA, TX, IN, NV	AR, AZ, CA, CO, KS, LA, MI, NM, SD, UT, WY.
Helium:		
Crude	KS and TX	
Grade-A	KS, WY, TX, OH, OK	CO, NM, UT.
Iodine, crude	OK	
Iron ore, usable	MN, MI, SD, CA	
Iron oxide pigments, crude	GA, AL, VA	
Kyanite	VA	
Lead[2]	AK, MO, ID, MT, WA	
Lime	MO, AL, KY, OH, NV	All other States, except AK, CT, DE, HI, IL, KS, MD, ME, MS, NC, NH, NJ, NM, NY, RI, SC, VT.
Lithium carbonate	NV	
Magnesite	NV	
Magnesium compounds	MI, UT, FL, DE, CA	
Magnesium metal	UT	
Mica, crude	SD, NC, GA, AL	
Molybdenum, concentrates	CO, AZ, UT, ID, MT	NM and NV.
Olivine	WA and NC	
Palladium[2]	MT	
Peat	FL, MN, IL, ME, NY	IA, IN, MI, NJ, OH, PA, WA
Perlite, crude	NM, OR, AZ, ID, CA	NV.
Phosphate rock	FL, NC, ID, UT	
Platinum[2]	MT	
Potash	NM, UT, MI	
Pumice and pumicite	CA, OR, NM, ID, NV	AZ and KS.
Pyrophyllite, crude	NC and CA	
Salt	LA, TX, NY, OH, KS	AL, AZ, CA, MI, NM, NV, OK, TN, UT, VA, WV.

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TABLE 2—Continued

NONFUEL MINERALS PRODUCED IN THE UNITED STATES, BY COMMODITY AND STATES IN 2009[1]

(Principal States based upon quantity unless otherwise noted)

Mineral	Principal States	Other States (alphabetical order)
Sand and gravel:		
Construction	CA, TX, AZ, MI, UT	All other States.
Industrial	IL, WI, TX, OK, MN	All other States, except AK, CT, DE, HI, KY, MA, MD, ME, MT, NH, NM, OR, SD, UT, VT, WY.
Silica stone[4]	AR	
Silver[2]	AK, NV, ID, UT, AZ	CA, CO, MO, MT, NM, SD.
Soda ash	WY and CA	
Staurolite	FL	
Stone:		
Crushed	TX, PA, MO, IL, FL	All other States.
Dimension	TX, WI, IN, GA, VT	All other States, except AK, DE, FL, HI, IA, KY, LA, MS, ND, NE, NJ, OR, RI.
Talc, crude	MT, TX, VT	
Titanium concentrates, ilmenite	VA and FL	
Tripoli	IL, OK, AR, PA	
Tungsten	CA	
Vermiculite, crude	SC and VA	
Wollastonite	NY	
Zeolites	NM, ID, TX, AZ, CA	NV.
Zinc[2]	AK, MO, ID, WA, MT	TN.
Zirconium concentrates	FL and VA	

[1]Table includes data available through July 26, 2011.

[2]Content of ores, etc.

[3]Principal States based on value.

[4]Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

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TABLE 3

VALUE OF NONFUEL MINERAL PRODUCTION IN THE UNITED STATES AND PRINCIPAL NONFUEL MINERALS PRODUCED IN 2009[1, 2]

State	Value (thousands)	Rank	Percentage of U.S. total	Principal minerals, in order of value
Alabama	$1,020,000	17	1.73	Stone (crushed), cement (portland), lime, sand and gravel (construction), cement (masonry).
Alaska	2,620,000	7	4.45	Zinc, gold, lead, silver, sand and gravel (construction).
Arizona	5,180,000	2	8.79	Copper, molybdenum concentrates, sand and gravel (construction), cement (portland), stone (crushed).
Arkansas	636,000	30	1.08	Stone (crushed), bromine, cement (portland), sand and gravel (construction), lime.
California	3,070,000	5	5.20	Sand and gravel (construction), cement (portland), boron minerals, stone (crushed), gold.
Colorado	1,420,000	13	2.40	Molybdenum concentrates, sand and gravel (construction), gold, cement (portland), stone (crushed).
Connecticut[3]	162,000	43	0.27	Stone (crushed), sand and gravel (construction), clays (common), stone (dimension), gemstones (natural).
Delaware[3]	24,500	50	0.04	Magnesium compounds, sand and gravel (construction), stone (crushed), gemstones (natural).
Florida	4,250,000	3	7.20	Phosphate rock, stone (crushed), cement (portland), sand and gravel (construction), zirconium concentrates.
Georgia	1,410,000	14	2.39	Clays (kaolin), stone (crushed), clays (fuller's earth), cement (portland), sand and gravel (construction).
Hawaii	116,000	46	0.20	Stone (crushed), sand and gravel (construction), gemstones (natural).
Idaho	935,000	21	1.59	Molybdenum concentrates, phosphate rock, silver, sand and gravel (construction), lead.
Illinois	929,000	22	1.57	Stone (crushed), sand and gravel (construction), cement (portland), sand and gravel (industrial), tripoli.
Indiana	806,000	25	1.37	Stone (crushed), cement (portland), sand and gravel (construction), lime, stone (dimension).
Iowa	596,000	31	1.01	Stone (crushed), cement (portland), sand and gravel (construction), lime, gypsum (crude).
Kansas	953,000	20	1.62	Helium (Grade–A), salt, cement (portland), stone (crushed), helium (crude).
Kentucky	668,000	27	1.13	Stone (crushed), lime, cement (portland), sand and gravel (construction), clays (common).
Louisiana	568,000	32	0.96	Salt, sand and gravel (construction), stone (crushed), sand and gravel (industrial), clays (common).
Maine	125,000	44	0.21	Sand and gravel (construction), stone (crushed), cement (portland), stone (dimension), peat.
Maryland	497,000	34	0.84	Stone (crushed), cement (portland), sand and gravel (construction), cement (masonry), stone (dimension).
Massachusetts[3]	214,000	41	0.36	Stone (crushed), sand and gravel (construction), lime, stone (dimension), clays (common).
Michigan	1,760,000	11	2.99	Iron ore (usable shipped), cement (portland), sand and gravel (construction), salt, stone (crushed).
Minnesota	2,150,000	8	3.65	Iron ore (usable shipped), sand and gravel (construction), stone (crushed), sand and gravel (industrial), stone (dimension).
Mississippi	208,000	42	0.35	Sand and gravel (construction), stone (crushed), clays (fuller's earth), clays (ball), cement (portland).
Missouri	1,810,000	9	3.07	Stone (crushed), cement (portland), lead, lime, sand and gravel (construction).
Montana	982,000	18	1.67	Molybdenum concentrates, copper, platinum metal, palladium metal, sand and gravel (construction).
Nebraska	248,000	38	0.42	Cement (portland), sand and gravel (construction), stone (crushed), sand and gravel (industrial), lime.
Nevada	6,020,000	1	10.21	Gold, copper, sand and gravel (construction), lime, silver.
New Hampshire	108,000	47	0.18	Sand and gravel (construction), stone (crushed), stone (dimension), gemstones (natural).
New Jersey[3]	270,000	37	0.46	Stone (crushed), sand and gravel (construction), sand and gravel (industrial), greensand marl, peat.
New Mexico	886,000	23	1.50	Potash, copper, sand and gravel (construction), stone (crushed), cement (portland).
New York	1,370,000	15	2.32	Salt, stone (crushed), sand and gravel (construction), cement (portland), clays (common).
North Carolina	846,000	24	1.44	Stone (crushed), phosphate rock, sand and gravel (construction), sand and gravel (industrial), stone (dimension).
North Dakota[3]	51,000	48	0.09	Sand and gravel (construction), lime, stone (crushed), clays (common), sand and gravel (industrial).
Ohio	1,130,000	16	1.92	Stone (crushed), salt, sand and gravel (construction), lime, cement (portland).
Oklahoma	667,000	28	1.13	Stone (crushed), cement (portland), sand and gravel (construction), iodine, sand and gravel (industrial).
Oregon	314,000	36	0.53	Stone (crushed), sand and gravel (construction), cement (portland), diatomite, perlite (crude).
Pennsylvania[3]	1,620,000	12	2.75	Stone (crushed), cement (portland), lime, sand and gravel (construction), cement (masonry).
Rhode Island[3]	43,400	49	0.07	Sand and gravel (construction), stone (crushed), sand and gravel (industrial), gemstones (natural).
South Carolina[3]	449,000	35	0.76	Stone (crushed), cement (portland), sand and gravel (construction), cement (masonry), sand and gravel (industrial).
South Dakota	230,000	39	0.39	Gold, cement (portland), sand and gravel (construction), stone (crushed), stone (dimension).
Tennessee	675,000	26	1.14	Stone (crushed), cement (portland), sand and gravel (construction), sand and gravel (industrial), lime.
Texas	2,650,000	6	4.49	Cement (portland), stone (crushed), sand and gravel (construction), salt, lime.
Utah	3,900,000	4	6.62	Copper, molybdenum concentrates, gold, magnesium metal, sand and gravel (construction).
Vermont[3]	122,000	45	0.21	Stone (crushed), sand and gravel (construction), stone (dimension), talc (crude), gemstones (natural).

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TABLE 3—Continued

VALUE OF NONFUEL MINERAL PRODUCTION IN THE UNITED STATES AND PRINCIPAL NONFUEL MINERALS PRODUCED IN 2009[1,2]

State	Value (thousands)	Rank	Percentage of U.S. total	Principal minerals, in order of value
Virginia	$955,000	19	1.62	Stone (crushed), sand and gravel (construction), cement (portland), lime, zirconium (concentrates).
Washington	650,000	29	1.10	Sand and gravel (construction), gold, stone (crushed), cement (portland), lime.
West Virginia	215,000	40	0.37	Stone (crushed), cement (portland), lime, sand and gravel (industrial), cement (masonry).
Wisconsin	546,000	33	0.93	Stone (crushed), sand and gravel (construction), sand and gravel (industrial), lime, stone (dimension).
Wyoming	1,800,000	10	3.05	Soda ash, helium (Grade-A), clays (bentonite), sand and gravel (construction), stone (crushed).
Undistributed	89,500	XX	0.15	
Total	59,000,000	XX	100.00	

XX Not applicable.

[1]Table includes data available through July 26, 2011.

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Partial total; excludes values that must be withheld to avoid disclosing company proprietary data which are included with "Undistributed."

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TABLE 4

VALUE OF NONFUEL MINERAL PRODUCTION PER CAPITA AND PER SQUARE KILOMETER IN 2009 BY STATE[1, 2]

State	Land area (square kilometers)	Population (thousands)	Total value (thousands)	Per capita		Per square kilometer	
				Dollars	Rank	Dollars	Rank
Alabama	131,000	4,710	$1,020,000	$216	16	$7,750	19
Alaska	1,480,000	698	2,620,000	3,750	1	1,770	44
Arizona	294,000	6,600	5,180,000	785	6	17,600	5
Arkansas	135,000	2,890	636,000	220	15	4,720	32
California	404,000	37,000	3,070,000	83	39	7,590	20
Colorado	269,000	5,030	1,420,000	282	13	5,270	28
Connecticut	12,500	3,520	162,000 [3]	46	46	12,900	9
Delaware	5,060	885	24,500 [3]	28	50	4,840	31
Florida	140,000	18,500	4,250,000	229	14	30,400	1
Georgia	150,000	9,830	1,410,000	144	22	9,420	16
Hawaii	16,600	1,300	116,000	89	37	6,950	22
Idaho	214,000	1,550	935,000	605	7	4,360	35
Illinois	144,000	12,900	929,000	72	43	6,450	25
Indiana	92,900	6,420	806,000	125	26	8,670	18
Iowa	145,000	3,010	596,000	198	17	4,120	36
Kansas	212,000	2,820	953,000	338	10	4,500	34
Kentucky	103,000	4,310	668,000	155	21	6,490	24
Louisiana	113,000	4,490	568,000	126	25	5,030	30
Maine	79,900	1,320	125,000	95	35	1,570	46
Maryland	25,300	5,700	497,000	87	38	19,600	3
Massachusetts	20,300	6,590	214,000 [3]	32	48	10,500	13
Michigan	147,000	9,970	1,760,000	177	20	12,000	10
Minnesota	206,000	5,270	2,150,000	408	9	10,400	14
Mississippi	121,000	2,950	208,000	70	44	1,710	45
Missouri	178,000	5,990	1,810,000	302	11	10,100	15
Montana	377,000	975	982,000	1,010	5	2,610	43
Nebraska	199,000	1,800	248,000	138	23	1,250	48
Nevada	284,000	2,640	6,020,000	2,280	3	21,200	2
New Hampshire	23,200	1,330	108,000	81	41	4,630	33
New Jersey	19,200	8,710	270,000 [3]	31	49	14,100	7
New Mexico	314,000	2,010	886,000	441	8	2,820	42
New York	122,000	19,500	1,370,000	70	45	11,200	11
North Carolina	126,000	9,380	846,000	90	36	6,710	23
North Dakota	179,000	647	51,000 [3]	79	42	285	50
Ohio	106,000	11,500	1,130,000	98	32	10,700	12
Oklahoma	178,000	3,690	667,000	181	19	3,750	40
Oregon	249,000	3,830	314,000	82	40	1,260	47
Pennsylvania	116,000	12,600	1,620,000 [3]	129	24	14,000	8
Rhode Island	2,710	1,050	43,400 [3]	41	47	16,100	6
South Carolina	78,000	4,560	449,000 [3]	98	31	5,760	27
South Dakota	197,000	812	230,000	283	12	1,170	49
Tennessee	107,000	6,300	675,000	107	29	6,320	26
Texas	678,000	24,800	2,650,000	107	30	3,910	37
Utah	213,000	2,790	3,900,000	1,400	4	18,400	4
Vermont	24,000	622	122,000 [3]	196	18	5,080	29
Virginia	103,000	7,880	955,000	121	27	9,320	17
Washington	172,000	6,660	650,000	97	33	3,770	39
West Virginia	62,400	1,820	215,000	118	28	3,460	41
Wisconsin	141,000	5,660	546,000	97	34	3,880	38
Wyoming	251,000	544	1,800,000	3,310	2	7,160	21
Undistributed	XX	XX	89,500	XX	XX	XX	XX
Total or average	9,160,000 [4]	306,000 [4]	59,000,000	192	XX	6,440	XX

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TABLE 4—Continued

VALUE OF NONFUEL MINERAL PRODUCTION PER CAPITA AND PER SQUARE KILOMETER IN 2009 BY STATE[1, 2]

XX Not applicable.

[1]Table includes data available through July 26, 2011.

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Partial total; excludes values that must be concealed to avoid disclosing company proprietary data. Concealed values included with "Undistributed."

[4]Excludes Washington, DC (which has no mineral production), with an area of 179 square kilometers and a population of 600,000.

Sources: U.S. Geological Survey and U.S. Census Bureau.

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TABLE 5

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Alabama:							
Cement:							
Masonry		450	59,300 e	303	38,000 e	208	25,600 e
Portland		5,060	486,000 e	4,640	450,000 e	3,420	307,000 e
Clays, common		2,240	42,300	1,970	34,400	1,340	25,300
Gemstones, natural		NA	398	NA	398	NA	143
Lime		2,480	234,000	2,320	239,000	1,960	225,000
Sand and gravel:							
Construction		16,700	96,500	13,800 r	87,300 r	10,000	64,800
Industrial		459	9,810	619	14,600	370	11,200
Stone:							
Crushed		55,600	382,000	50,000	370,000 r	36,400	332,000
Dimension, marble, sandstone		(4)	W	7	3,720	4	1,460
Combined values of clays (bentonite, kaolin), iron oxide pigments (crude), mica [crude (2008–09)], salt, and value indicated by symbol W		XX	24,300	XX	26,700 r	XX	26,500
Total		XX	1,330,000	XX	1,260,000 r	XX	1,020,000
Alaska:							
Gemstones, natural		NA	13	NA	69	NA	69
Sand and gravel, construction		13,400 r	78,000 r	11,400 r	84,800 r	7,320	55,500
Stone, crushed		1,750	20,000	1,990 r	31,400 r	1,940	34,800
Combined values of cadmium (byproduct from zinc concentrates), gold, lead, silver, zinc		XX	3,440,000	XX	2,540,000	XX	2,530,000
Total		XX	3,540,000	XX	2,650,000 r	XX	2,620,000
Arizona:							
Clays, bentonite		30	1,520	23	1,220	17	913
Copper[5]		731	5,290,000	836	5,880,000	711	3,780,000
Gemstones, natural		NA	1,950	NA	1,960	NA	1,540
Gypsum, crude		292	1,770	247	1,840	213	1,740
Sand and gravel, construction		86,500 r	657,000 r	67,200 r	562,000 r	40,200	357,000
Stone:							
Crushed		17,100	157,000	15,300 r	153,000 r	9,120	80,000
Dimension, sandstone		(4)	W	123	16,400	94	13,800
Combined values of cement, clays (common), gold, lime, molybdenum concentrates, perlite (crude), pumice and pumicite, salt, sand and gravel (industrial), silver, zeolites, and value indicated by symbol W		XX	1,170,000 r	XX	1,230,000 r	XX	942,000
Total		XX	7,280,000	XX	7,850,000 r	XX	5,180,000
Arkansas:							
Clays, common		1,120	4,520	796	10,700	539	7,630
Gemstones, natural		NA	601	NA	607	NA	410
Sand and gravel, construction		9,080	66,300	8,800	65,100	8,980	69,800
Silica stone[6]	metric tons	231	1,020	(4)	W	(4)	W
Stone:							
Crushed		33,000	237,000	32,200	241,000 r	30,000	217,000
Dimension		(4)	W	21	2,740	18	2,360
Combined values of bromine, cement, clays (kaolin), gypsum (crude), lime, sand and gravel (industrial), tripoli, and values indicated by symbol W		XX	467,000 r	XX	390,000 r	XX	339,000
Total		XX	776,000 r	XX	710,000 r	XX	636,000

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TABLE 5--Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
California:						
Cement:						
Masonry	522	68,900 e	337	43,600 e	236	28,100 e
Portland	10,800	1,180,000 e	9,880	1,030,000 e	7,150	646,000 e
Clays:						
Bentonite	29	3,090	30	3,360	22	2,310
Common	549	3,390	469	3,570	318	2,370
Fire	(4)	W	118	W	(4)	W
Gemstones, natural	NA	818	NA	732	NA	727
Gypsum, crude	1,150	6,980	861	6,390	825	5,850
Sand and gravel:						
Construction	142,000 r	1,530,000 r	111,000 r	1,260,000 r	79,200	912,000
Industrial	1,850	43,400	1,500	42,300	1,300	35,800
Stone:						
Crushed	51,000	533,000	51,400 r	572,000 r	41,400	378,000
Dimension	39	12,300	26	7,320	25	6,100
Combined values of boron minerals, clays (fuller's earth, kaolin), diatomite, feldspar, gold, iron ore (usable shipped), lime, magnesium compounds, perlite (crude), pumice and pumicite, pyrophyllite (2009), salt, silver, soda ash, talc [crude (2007–08)], tungsten, zeolites, and values indicated by symbol W	XX	1,030,000 r	XX	1,240,000 r	XX	1,050,000
Total	XX	4,420,000	XX	4,200,000	XX	3,070,000
Colorado:						
Clays:						
Bentonite	(4)	W	2	40	1	30
Common	174	1,100	141	644	60	405
Gemstones, natural	NA	261	NA	419	NA	426
Sand and gravel, construction	47,200 r	373,000 r	37,800 r	299,000 r	29,300	217,000
Stone:						
Crushed	10,300	76,700	9,590 r	71,300 r	6,970	63,200
Dimension	21	3,870	27	4,510	11	3,110
Combined values of cement, clays [fire (2009)], gold, gypsum (crude), helium (Grade-A), lime, molybdenum concentrates, sand and gravel (industrial), silver, and value indicated by symbol W	XX	1,590,000	XX	1,680,000	XX	1,130,000
Total	XX	2,050,000 r	XX	2,060,000 r	XX	1,420,000
Connecticut:						
Clays, common	36	(7)	(4)	(7)	20	224
Gemstones, natural	NA	6	NA	7	NA	7
Sand and gravel, construction	8,340 r	73,800 r	7,350 r	69,600 r	5,680	60,800
Stone:						
Crushed	10,400	119,000	9,640 r	106,000 r	8,030	101,000
Dimension	(4)	(7)	(4)	(7)	(4)	(7)
Total	XX	192,000	XX	175,000 r	XX	162,000
Delaware:						
Gemstones, natural	NA	1	NA	1	NA	1
Magnesium compounds	(4)	(7)	(4)	(7)	(4)	(7)
Sand and gravel, construction	3,520	26,400	2,550	20,600	2,080	24,500
Stone, crushed	(4)	(7)	(4)	(7)	(4)	(7)
Total	XX	26,400	XX	20,600	XX	24,500

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Florida:						
Cement:						
Masonry	524	86,100 e	310	47,000 e	123	18,700 e
Portland	5,510	557,000 e	4,980	518,000 e	3,150	307,000 e
Clays:						
Common	3	W	2	W	(4)	W
Kaolin	21	2,770	19	2,520	18	3,000
Gemstones, natural	NA	1	NA	1	NA	1
Peat	501	9,800	488	9,760	527	10,100
Sand and gravel:						
Construction	30,400 r	232,000 r	28,200 r	219,000	15,600	125,000
Industrial	441	8,110	573	7,480	431	8,270
Stone, crushed	96,400	1,150,000	68,400 r	894,000 r	48,600	643,000
Combined values of clays (fuller's earth), lime, magnesium compounds, phosphate rock, staurolite, titanium concentrates, zirconium concentrates, and values indicated by symbol W	XX	1,360,000	XX	2,040,000	XX	3,130,000
Total	XX	3,410,000	XX	3,730,000	XX	4,250,000
Georgia:						
Barite	(4)	W	7	1,350	7	1,350
Clays:						
Common	1,350	8,110	952	6,020	631	3,870
Fuller's earth	758	67,700	646 r, 8	51,800 r, 8	(4)	W
Kaolin	6,570	924,000	6,290	872,000	4,970	693,000
Gemstones, natural	NA	9	NA	74	NA	74
Sand and gravel:						
Construction	10,200	63,800	7,360 r	40,300 r	5,260	31,100
Industrial	1,040	18,100	841	20,700	775	19,300
Stone:						
Crushed	80,100	815,000	61,900	666,000	45,100	518,000
Dimension	162	18,900	169	18,200	153	16,900
Combined values of cement, clays [fuller's earth (2008)], feldspar, iron oxide pigments (crude), lime, mica (crude), and values indicated by symbol W	XX	148,000	XX	114,000	XX	128,000
Total	XX	2,060,000	XX	1,790,000 r	XX	1,410,000
Hawaii:						
Gemstones, natural	NA	151	NA	151	NA	151
Sand and gravel, construction	1,850 r	24,100 r	1,640 r	29,800 r	1,130	14,300
Stone, crushed	8,800	141,000	7,410 r	134,000 r	5,920	101,000
Total	XX	165,000 r	XX	164,000 r	XX	116,000
Idaho:						
Gemstones, natural	NA	339	NA	430	NA	491
Sand and gravel, construction	24,200 r	127,000 r	18,800 r	107,000 r	12,900	75,000
Stone:						
Crushed	6,170	37,500	5,950 r	38,800 r	4,410	30,800
Dimension, quartzite, sandstone	34	4,200	34	4,130	25	3,370

See footnotes at end of table.

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TABLE 5—Continued
NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Idaho—Continued:							
Combined values of cadmium (byproduct from zinc concentrates), cement (portland), copper, feldspar, garnet (industrial), gold, lead, lime, molybdenum concentrates, perlite (crude), phosphate rock, pumice and pumicite, sand and gravel (industrial), silver, zeolites, zinc		XX	612,000	XX	921,000	XX	826,000
Total		XX	781,000 r	XX	1,070,000	XX	935,000
Illinois:							
Cement, portland		3,120	309,000 e	2,660	263,000 e	1,490	141,000 e
Clays, fuller's earth		(4)	W	112	W	(4)	W
Gemstones, natural		NA	34	NA	10	NA	9
Sand and gravel:							
Construction		32,100 r	177,000 r	27,000 r	168,000 r	22,500	144,000
Industrial		4,090	86,800	3,980	108,000	3,440	104,000
Stone, crushed		78,400	614,000	67,600 r	613,000 r	56,500	513,000
Combined values of clays (common), lime (2007–08), peat, stone, (dimension dolomite), tripoli, and values indicated by symbol W		XX	61,100	XX	60,900	XX	26,900
Total		XX	1,250,000	XX	1,210,000 r	XX	929,000
Indiana:							
Cement, portland		2,980	263,000 e	2,590	226,000 e	2,690	233,000 e
Clays, common		624	8,980	667	8,080	413	6,610
Gemstones, natural		NA	4	NA	4	NA	4
Sand and gravel, construction		28,300	154,000 r	23,300 r	139,000 r	18,800	100,000
Stone:							
Crushed		57,800	383,000	51,800 r	352,000 r	44,100	290,000
Dimension		236	37,800	203	35,600	206	41,500
Combined values of cement (masonry), clays (ball), gypsum (crude), lime, peat, sand and gravel (industrial)		XX	140,000 r	XX	131,000 r	XX	134,000
Total		XX	986,000 r	XX	892,000 r	XX	806,000
Iowa:							
Clays, common		331	2,630	269	1,140	184	828
Gemstones, natural		NA	3	NA	3	NA	3
Gypsum, crude		1,490	9,050	1,250	9,230	1,780	14,800
Sand and gravel, construction		17,100	94,100 r	15,800 r	89,500 r	13,600	87,600
Stone, crushed		35,500	286,000	38,700 r	312,000 r	32,600	297,000
Combined values of cement, lime, peat, sand and gravel (industrial)		XX	289,000 r	XX	268,000 r	XX	196,000
Total		XX	681,000 r	XX	680,000	XX	596,000
Kansas:							
Cement, portland		2,760	282,000 e	2,400	246,000 e	1,670	170,000 e
Clays, common		563	3,830	548	2,840	381	2,430
Gemstones, natural		NA	1	NA	1	NA	1
Helium, Grade–A	million cubic meters	88	316,000	79	384,000	68	332,000
Salt		2,870	158,000	3,010	178,000	2,710	188,000
Sand and gravel, construction		11,200 r	52,100 r	10,500 r	51,600 r	8,580	43,300
Stone:							
Crushed		23,400	199,000	23,100 r	180,000	17,200	143,000
Dimension		14	1,990	20	2,560	29	4,650

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Kansas—Continued:						
Combined values of cement (masonry), clays (fuller's earth), gypsum (crude), helium (crude), pumice and pumicite, sand and gravel (industrial)	XX	62,200 r	XX	77,500 r	XX	69,200
Total	XX	1,070,000 r	XX	1,120,000	XX	953,000
Kentucky:						
Clays, common	598	3,720	419	8,170	288	5,980
Gemstones, natural	NA	48	NA	173	NA	37
Sand and gravel, construction	9,070	48,300	7,620 r	41,700 r	7,260	39,800
Stone, crushed	56,000	432,000	52,700 r	422,000 r	44,300	389,000
Combined values of cement, clays (ball), lime	XX	307,000	XX	324,000 r	XX	233,000
Total	XX	791,000	XX	796,000 r	XX	668,000
Louisiana:						
Clays, common	552	13,800	509	12,900	353	9,120
Gemstones, natural	NA	7	NA	7	NA	7
Salt	13,900	180,000	14,600	231,000	13,200	229,000
Sand and gravel:						
Construction	26,200 r	240,000 r	22,900 r	231,000 r	20,600	205,000
Industrial	635	21,200	748	23,100	682	25,900
Combined values of gypsum (crude), lime, stone (crushed limestone and sandstone)	XX	106,000 r	XX	123,000 r	XX	99,500
Total	XX	561,000 r	XX	620,000 r	XX	568,000
Maine:						
Gemstones, natural	NA	277	NA	282	NA	352
Sand and gravel, construction	11,300 r	85,900 r	10,200 r	69,100 r	9,090	59,300
Stone:						
Crushed	4,680	37,700	4,020 r	33,900 r	3,600	31,600
Dimension	6	1,580	7	1,720	6	1,300
Combined values of cement, clays (common), peat	XX	53,900	XX	56,000	XX	32,600
Total	XX	179,000 r	XX	161,000 r	XX	125,000
Maryland:						
Cement, portland	3,000	265,000 e	(4)	W	(4)	W
Clays, common	173	W	(4)	W	(4)	W
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	12,400	123,000	12,000	126,000	7,980	99,200
Industrial	--	--	(4)	W	--	--
Stone:						
Crushed	31,100	282,000	26,100 r	237,000 r	22,300	200,000
Dimension	17	2,680	(4)	W	(4)	W
Combined values of cement (masonry), and values indicated by symbol W	XX	(7)	XX	279,000	XX	198,000
Total	XX	672,000	XX	642,000 r	XX	497,000
Massachusetts:						
Clays, common	31	(7)	24	(7)	(4)	(7)
Gemstones, natural	NA	1	NA	1	NA	1
Lime	(4)	(7)	(4)	(7)	(4)	(7)
Sand and gravel, construction	15,800	141,000	11,300 r	110,000 r	9,460	85,600

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Massachusetts—Continued:						
Stone:						
Crushed	12,300	140,000	11,200 r	130,000 r	10,500	122,000
Dimension	98	12,000	53	7,140	44	6,130
Total	XX	293,000	XX	246,000 r	XX	214,000
Michigan:						
Cement:						
Masonry	149	20,200 e	99	12,000 e	80	9,800 e
Portland	5,490	537,000 e	4,930	502,000 e	3,550	350,000 e
Clays, common	533	2,250	365	1,730	318	1,310
Gemstones, natural	NA	2	NA	2	NA	2
Gypsum, crude	841 r	5,100 r	603 r	4,490 r	372	3,110
Iron ore, usable shipped	12,200	W	12,500 r	W	8,870	W
Sand and gravel:						
Construction	57,100 r	231,000 r	45,100 r	211,000 r	34,600	176,000
Industrial	1,360	30,000	1,500	26,800	1,330	27,700
Stone, crushed	26,800	130,000	26,100 r	136,000 r	20,400	115,000
Combined values of lime, magnesium compounds, peat, potash, salt, stone (dimension dolomite sandstone), and values indicated by symbol W	XX	1,010,000	XX	1,130,000	XX	1,080,000
Total	XX	1,970,000	XX	2,020,000 r	XX	1,760,000
Minnesota:						
Gemstones, natural	NA	6	NA	7	NA	7
Iron ore, usable shipped	38,800	W	41,100	W	18,700	W
Peat	41	4,350	48	4,540	44	2,850
Sand and gravel, construction	47,000 r	242,000 r	34,700 r	227,000 r	30,800	188,000
Stone:						
Crushed	10,400	111,000	10,300 r	122,000 r	8,670	110,000
Dimension	28	14,400	31	17,200	25	16,700
Combined values of clays [common (2007–08)], lime, sand and gravel (industrial), and values indicated by symbol W	XX	2,410,000	XX	3,090,000	XX	1,830,000
Total	XX	2,790,000 r	XX	3,460,000 r	XX	2,150,000
Mississippi:						
Clays:						
Bentonite	67	4,610	53	3,690	(4)	W
Common	508	2,980	433	2,340	263	1,540
Fuller's earth	(4)	W	384	W	(4)	W
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel, construction	15,000	102,000	12,800 r	91,400 r	12,700	101,000
Stone, crushed	3,120	58,900	4,380	88,800	3,130	63,400
Combined values of cement (portland), clays (ball), lime (2007), sand and gravel (industrial), and values indicated by symbol W	XX	76,900	XX	77,200	XX	42,200
Total	XX	245,000	XX	263,000 r	XX	208,000
Missouri:						
Cement, portland	5,230	515,000 e	4,650	451,000 e	4,420	434,000 e
Clays, common	426	2,880	496	3,470	421	3,020
Sand and gravel:						
Construction	14,300 r	78,500 r	12,400 r	76,200 r	11,500	71,900
Industrial	642	19,400	648	21,400	763	28,900

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Missouri—Continued:							
Stone, crushed		83,900	630,000	76,400 r	614,000 r	67,700	598,000
Combined values of cadmium (byproduct from zinc concentrates), cement (masonry), clays (fire, fuller's earth), copper, gemstones (natural), lead, lime, silver, stone (dimension granite), zinc		XX	1,040,000	XX	892,000 r	XX	672,000
Total		XX	2,280,000	XX	2,060,000	XX	1,810,000
Montana:							
Gemstones, natural		NA	386	NA	380	NA	378
Palladium[5]	kilograms	12,800	148,000	11,900	136,000	12,700	108,000
Platinum[5]	do.	3,860	162,000	3,580	182,000	3,830	149,000
Sand and gravel, construction		16,000 r	135,000 r	13,400 r	110,000 r	11,200	85,500
Stone, crushed		1,810	9,800	1,980 r	14,000 r	1,990	20,400
Combined values of cadmium (byproduct from zinc concentrates), cement, clays (bentonite, common), copper, garnet (industrial), gold, lead, lime, molybdenum concentrates, silver, stone (dimension), talc (crude), zinc		XX	910,000	XX	924,000 r	XX	619,000
Total		XX	1,370,000 r	XX	1,370,000 r	XX	982,000
Nebraska:							
Clays, common		135 e	W	109 e	W	(4)	W
Gemstones, natural		NA	4	NA	4	NA	4
Sand and gravel, construction		13,500 r	71,100 r	14,000 r	75,400 r	12,900	75,500
Stone, crushed		7,690	75,600	7,960	78,100	6,340	59,700
Combined values of cement, lime, sand and gravel [(industrial (2009)], and values indicated by symbol W		XX	(7)	XX	(7)	XX	113,000
Total		XX	147,000 r	XX	153,000 r	XX	248,000
Nevada:							
Barite		(4)	W	641	29,500	377	18,500
Gold[5]	kilograms	186,000	4,170,000	178,000	5,000,000	161,000	5,040,000
Sand and gravel, construction		34,800 r	180,000	29,500 r	163,000 r	21,400	138,000
Silver[5]	kilograms	243,000	105,000	235,000	113,000	203,000	95,900
Stone, crushed		12,700	111,000	10,200 r	95,100 r	8,290	90,500
Combined values of brucite (2007), cement (portland), clays (bentonite, fuller's earth, kaolin), copper, diatomite, gemstones (natural), gypsum (crude), lime, lithium carbonate, magnesite, molybdenum concentrates, perlite (crude), pumice and pumicite, salt, sand and gravel (industrial), stone (dimension), zeolites, and value indicated by symbol W		XX	831,000 r	XX	893,000 r	XX	639,000
Total		XX	5,400,000 r	XX	6,290,000 r	XX	6,020,000
New Hampshire:							
Gemstones, natural		NA	6	NA	7	NA	7
Sand and gravel, construction		8,150 r	50,300 r	8,150 r	51,200 r	6,930	55,600
Stone:							
Crushed		6,550	67,800	5,170	50,900	4,680	47,000
Dimension, granite		37	5,570	34	4,900	35	4,880
Total		XX	124,000 r	XX	107,000 r	XX	108,000

See footnotes at end of table.

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TABLE 5—Continued
NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
New Jersey:						
Clays, common	65	W	--	--	--	--
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	15,700 r	145,000	13,600 r	153,000 r	11,100	116,000
Industrial	1,090	33,200	1,010	31,800	906	30,200
Stone, crushed	20,000	162,000	17,900	155,000	14,500	124,000
Combined values of greensand marl, peat, and value indicated by symbol W	XX	3,220	XX	(7)	XX	(7)
Total	XX	343,000	XX	339,000 r	XX	270,000
New Mexico:						
Clays, common	28	269	14	120	10	90
Copper[5]	108	783,000	104	734,000	56	300,000
Gemstones, natural	NA	24	NA	21	NA	21
Sand and gravel:						
Construction	18,400 r	158,000 r	14,600 r	127,000 r	14,700	118,000
Industrial	(4)	W	(4)	W	--	--
Stone:						
Crushed	7,590	56,700	7,020 r	43,400 r	6,130	40,200
Dimension	(4)	W	27	939	32	986
Combined values of cement, gold, gypsum (crude), helium (Grade–A), lime (2007–08), molybdenum concentrates, perlite (crude), potash, pumice and pumicite, salt, silver, zeolites, and values indicated by symbol W	XX	582,000 r	XX	720,000	XX	427,000
Total	XX	1,580,000	XX	1,630,000 r	XX	886,000
New York:						
Clays, common	699	28,500	745	28,200	605	30,200
Gemstones, natural	NA	96	NA	96	NA	97
Salt	7,990	400,000	7,660	431,000	6,240	426,000
Sand and gravel, construction	34,300 r	286,000 r	34,400 r	260,000 r	31,100	266,000
Stone:						
Crushed	47,300	432,000	41,000 r	384,000 r	96,900	410,000
Dimension	70	12,000	57	16,000	97	28,200
Combined values of cadmium [byproduct from zinc concentrates (2007–08)], cement, garnet (industrial), peat, sand and gravel (industrial), talc [crude (2007–08)], wollastonite, zinc (2007–08)	XX	393,000	XX	354,000	XX	207,000
Total	XX	1,550,000	XX	1,470,000 r	XX	1,370,000
North Carolina:						
Clays:						
Common	1,720	19,500	1,260	12,900	828	4,980
Kaolin	20	792	15	W	9	W
Gemstones, natural	NA	384	NA	659	NA	360
Mica, crude	43	10,300	22	4,580	16	4,430
Sand and gravel:						
Construction	11,500 r	62,900 r	9,770 r	58,800 r	7,570	43,000
Industrial	1,670	31,300	1,510 r	29,400	1,300	28,000

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
North Carolina—Continued:							
Stone:							
Crushed		70,200	898,000	57,500	806,000	38,500	584,000
Dimension		48	20,400	58	25,200	62	22,300
Combined values of andalusite, feldspar, olivine, phosphate rock, pyrophyllite (crude), and values indicated by symbol W		XX	131,000	XX	150,000 r	XX	160,000
Total		XX	1,170,000	XX	1,090,000	XX	846,000
North Dakota:							
Clays, common		(4)	(7)	84	549	(4)	(7)
Gemstones, natural		NA	4	NA	4	NA	4
Lime		(4)	(7)	(4)	(7)	(4)	(7)
Sand and gravel:							
Construction		15,000 r	49,400 r	12,100 r	39,200 r	14,400	47,000
Industrial		(4)	(7)	(4)	(7)	(4)	(7)
Stone, crushed		274	1,270	26	133	985	3,980
Total		XX	50,600 r	XX	39,800 r	XX	51,000
Ohio:							
Cement, portland		916	92,000 e	762	74,000 e	550	53,000 e
Clays, common		1,190	16,500	983	15,900	770	13,400
Gemstones, natural		NA	4	NA	4	NA	4
Lime		1,690	159,000	1,670	166,000	1,130	129,000
Sand and gravel:							
Construction		41,000 r	272,000 r	33,800 r	244,000 r	27,200	241,000
Industrial		1,080	33,000	1,010	34,300	849	26,300
Stone:							
Crushed		68,000	448,000	54,100 r	446,000 r	42,700	388,000
Dimension		37	6,050	29 r	3,660 r	26	4,790
Combined values of cement (masonry), clays (fire), peat, salt		XX	254,000	XX	262,000 r	XX	277,000
Total		XX	1,280,000	XX	1,250,000 r	XX	1,130,000
Oklahoma:							
Clays, common		1,050	5,170	756	3,900	572	2,800
Gemstones, natural		NA	106	NA	4	NA	4
Gypsum, crude		2,820 r	17,100 r	2,180 r	16,200 r	2,180	15,900
Sand and gravel:							
Construction		16,200	94,200 r	14,700 r	95,500 r	11,600	68,200
Industrial		1,710	44,600	2,040	63,700	1,410	40,300
Stone:							
Crushed		45,800	298,000	47,200 r	345,000 r	36,800	308,000
Dimension		65	11,700	53	8,750	35	4,330
Tripoli	metric tons	40,600	1,600	86,000	1,800	(4)	W
Combined values of cement, feldspar, helium (Grade-A), iodine (crude), lime, salt, and value indicated by symbol W		XX	261,000	XX	285,000	XX	228,000
Total		XX	734,000 r	XX	820,000 r	XX	667,000
Oregon:							
Gemstones, natural		NA	2,150	NA	1,620	NA	1,220
Sand and gravel, construction		21,200	164,000 r	14,900 r	121,000 r	12,200	102,000
Stone, crushed		30,600	211,000	23,500 r	174,000 r	15,800	119,000

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
Oregon—Continued:							
Combine values of cement (portland), clays [bentonite, common (2007–08)], diatomite, emery (2008–09), lime, perlite (crude), pumice and pumicite		XX	128,000	XX	106,000	XX	91,500
Total		XX	506,000 r	XX	402,000 r	XX	314,000
Pennsylvania:							
Cement:							
Masonry		304	40,500 e	254	34,000 e	176	23,700 e
Portland		5,660	568,000 e	5,150	510,000 e	3,740	356,000 e
Clays, common		683	4,890	640	4,840	451	3,040
Gemstones, natural		NA	1	NA	1	NA	1
Lime		1,100	112,000	1,130	126,000	985	126,000
Peat		2	79	2	62	3	90
Sand and gravel:							
Construction		18,300	143,000	16,100 r	132,000 r	13,900	114,000
Industrial		685	15,800	677	16,300	618	15,600
Stone:							
Crushed		111,000	960,000	101,000 r	1,140,000	83,000	975,000
Dimension		59	16,200	42	11,100	39	9,670
Tripoli		(4)	(7)	(4)	(7)	(4)	(7)
Total		XX	1,860,000	XX	1,970,000	XX	1,620,000
Rhode Island:							
Gemstones, natural		NA	1	NA	1	NA	1
Sand and gravel:							
Construction		2,410	31,200	2,000 r	27,400 r	1,820	23,300
Industrial		(4)	(7)	(4)	(7)	(4)	(7)
Stone, crushed		2,240	21,200	1,840 r	17,900 r	1,820	20,200
Total		XX	52,400	XX	45,300 r	XX	43,400
South Carolina:							
Cement:							
Masonry		491	60,100 e	323	41,600 e	174	22,000 e
Portland		3,680	355,000 e	2,930	284,000 e	1,870	169,000 e
Clays:							
Common		826	3,990	461	2,130	311	1,300
Fire		37	83	29	66	--	--
Kaolin		297	17,600	199	11,300	144	8,590
Gemstones, natural		NA	1	NA	1	NA	1
Mica, crude		(4)	(7)	(4)	(7)	--	--
Sand and gravel:							
Construction		10,500 r	57,700 r	9,660 r	46,500 r	5,900	32,900
Industrial		837	22,000	679	21,100	441	14,000
Stone:							
Crushed		30,400	290,000	22,500	235,000	18,200	201,000
Dimension		9	850	4	472	3	401
Vermiculite		(4)	(7)	(4)	(7)	(4)	(7)
Total		XX	808,000 r	XX	642,000 r	XX	449,000
South Dakota:							
Clays, common		151	W	155	W	(4)	W
Sand and gravel, construction		14,300 r	52,000 r	12,500 r	48,000 r	10,500	37,900
Silver	kilograms	--	--	--	--	8,570	4,040
Stone, crushed		5,430	36,600	5,390	34,300	4,450	29,300

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
South Dakota—Continued:							
Combined values of cement (portland), feldspar, gemstones (natural), gold, gypsum (crude), iron ore (usable shipped), lime, mica (crude), stone (dimension granite), and values indicated by symbol W		XX	175,000	XX	165,000 r	XX	159,000
Total		XX	263,000 r	XX	247,000 r	XX	230,000
Tennessee:							
Clays:							
Ball		677	30,600	568	25,900	511	22,800
Common		199	1,360	155	1,090	133	816
Sand and gravel:							
Construction		7,640 r	54,500 r	7,180 r	56,200 r	5,360	42,800
Industrial		1,070	32,400	983 r	32,800	783	27,100
Stone, crushed		63,400	559,000	46,200	461,000	40,100	431,000
Combined values of cadmium (byproduct from zinc concentrates), cement, clays (fuller's earth), gemstones (natural), lime, salt, stone (dimension marble), zinc		XX	315,000	XX	281,000 r	XX	150,000
Total		XX	992,000 r	XX	859,000 r	XX	675,000
Texas:							
Cement:							
Masonry		368	52,100 e	274	40,300 e	202	28,300 e
Portland		10,900	1,060,000 e	11,100	1,110,000 e	8,350	815,000 e
Clays:							
Bentonite		64	3,730	73	12,000	54	8,610
Common		1,950	12,600	2,070	13,700	1,800	13,000
Gemstones, natural		NA	202	NA	202	NA	202
Gypsum, crude		2,520 r	15,300 r	1,870 r	13,900 r	1,310	9,330
Lime		1,620	132,000	1,500	128,000	1,040	105,000
Salt		8,950	143,000	9,080	157,000	8,910	164,000
Sand and gravel:							
Construction		96,100 r	656,000 r	88,300 r	631,000 r	70,000	528,000
Industrial		3,280	123,000	3,590 r	139,000	2,130	84,400
Stone:							
Crushed		153,000	1,020,000	150,000 r	1,100,000 r	110,000	782,000
Dimension		243	31,600	269	27,700	236	42,000
Combined values of brucite (2007–08), clays [ball, fire (2009), fuller's earth, kaolin], helium, talc (crude), zeolites		XX	72,100	XX	77,700	XX	69,700
Total		XX	3,320,000 r	XX	3,450,000 r	XX	2,650,000
Utah:							
Beryllium concentrates	metric tons	3,810	NA	4,410	NA	3,030	NA
Clays, common		531	10,400	479	10,200	342	7,230
Gemstones, natural		NA	240	NA	781	NA	783
Salt		2,470	135,000	2,150	139,000	2,000	152,000
Sand and gravel, construction		45,700 r	265,000 r	38,900 r	222,000 r	32,400	190,000
Stone:							
Crushed		13,200	97,800	8,950 r	72,700 r	4,830	39,400
Dimension, sandstone		8	619	9	707	9	844

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Utah—Continued:						
Combined values of cement (portland), clays (bentonite), copper, gold, gypsum (crude), helium (Grade–A), lime, magnesium compounds, magnesium metal, molybdenum concentrates, phosphate rock, potash, silver	XX	3,370,000	XX	3,730,000	XX	3,510,000
Total	XX	3,880,000	XX	4,170,000 r	XX	3,900,000
Vermont:						
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel, construction	5,310 r	35,300 r	4,960 r	33,600 r	4,470	36,700
Stone:						
Crushed	6,460	46,200	5,690 r	47,500 r	5,430	54,900
Dimension	110	35,700	112	35,900	108	30,000
Talc, crude	(4)	(7)	(4)	(7)	(4)	(7)
Total	XX	117,000 r	XX	117,000 r	XX	122,000
Virginia:						
Clays, common	725	7,840	766	8,540	505	5,830
Kyanite	118	29,100	97	25,500	71	20,000
Mica, crude	(9)	1	--	--	--	--
Sand and gravel, construction	12,400 r	116,000 r	10,400 r	111,000 r	8,180	93,100
Stone, crushed	62,600	713,000	57,400 r	712,000 r	42,200	577,000
Combined values of cement, clays (fuller's earth), feldspar, gemstones (natural), iron oxide pigments (crude), lime, salt, sand and gravel (industrial), stone (dimension), titanium concentrates (ilmenite), vermiculite (crude), zirconium concentrates	XX	310,000	XX	318,000 r	XX	260,000
Total	XX	1,180,000	XX	1,170,000 r	XX	955,000
Washington:						
Clays, common	84	170	88	360	(4)	W
Gemstones, natural	NA	49	NA	50	NA	65
Peat	(4)	66	(4)	75	(4)	W
Sand and gravel, construction	45,700 r	325,000 r	39,600 r	326,000 r	29,900	230,000
Stone, crushed	18,000	166,000	17,500 r	168,000 r	14,700	131,000
Combined values of cadmium (byproduct from zinc concentrates), cement (portland), clays [fire (2009)], diatomite, gold (2008–09), lead, lime, olivine, sand and gravel (industrial), stone (dimension miscellaneous), zinc, and values indicated by symbol W	XX	258,000	XX	228,000	XX	289,000
Total	XX	749,000 r	XX	722,000 r	XX	650,000
West Virginia:						
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	675	5,620	426	3,840	410	3,480
Industrial	345	17,600	338	17,200	241	14,700
Stone, crushed	14,600	115,000	15,200 r	127,000 r	12,500	126,000
Combined values of cement, clays (common), lime, peat (2007), salt, stone (dimension sandstone)	XX	87,400	XX	85,300 r	XX	71,600
Total	XX	226,000	XX	234,000 r	XX	215,000

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TABLE 5—Continued

NONFUEL MINERAL PRODUCTION IN THE UNITED STATES, BY STATE[1, 2, 3]

(Thousand metric tons and thousand dollars unless otherwise specified)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Wisconsin:						
Gemstones, natural	NA	6	NA	7	NA	7
Lime	959	78,000	852	71,500	751	70,100
Peat	(4)	26	(4)	26	--	--
Sand and gravel:						
Construction	39,000 r	189,000 r	36,200 r	190,000 r	29,100	143,000
Industrial	2,650	90,100	3,290	120,000	2,730	105,000
Stone:						
Crushed	32,800	191,000	25,900	238,000 r	22,900	198,000
Dimension	307	35,900	250	33,300	207	29,800
Total	XX	585,000 r	XX	652,000 r	XX	546,000
Wyoming:						
Clays:						
Bentonite	4,250	227,000	4,400 r	233,000 r	3,230	172,000
Common	59	226	37	89	41	104
Gemstones, natural	NA	15	NA	14	NA	14
Sand and gravel, construction	19,500 r	98,300 r	17,500 r	103,000 r	17,200	92,200
Stone, crushed	12,500	61,400	12,100	57,100	16,000	75,400
Combined values of cement (portland), gypsum (crude), helium (Grade–A), lime, soda ash, stone [dimension (2008–09)], zeolites (2007)	XX	1,370,000	XX	1,640,000	XX	1,460,000
Total	XX	1,760,000	XX	2,030,000 r	XX	1,800,000
Undistributed:						
Connecticut, Delaware, Maryland (2007), Massachusetts, Nebraska (2007–08), New Jersey (2008–09), North Dakota, Pennsylvania, Rhode Island, South Carolina, Vermont, Undistributed	XX	190,000	XX	167,000 r	XX	89,500

[e]Estimated. [r]Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; included in "Combined values" data for each State.
XX Not applicable. -- Zero.

[1]Table includes data available through July 26, 2011.

[2]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[3]Data are rounded to no more than three significant digits; may not add to totals shown.

[4]Withheld to avoid disclosing company proprietary data.

[5]Recoverable content of ores, etc.

[6]Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

[7]Withheld to avoid disclosing company proprietary data; value included in "Undistributed."

[8]Excludes attapulgite; included in "Combined values."

[9]Less than ½ unit.

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TABLE 6

NONFUEL RAW MINERAL PRODUCTION IN THE COMMONWEALTH OF PUERTO RICO AND ISLANDS ADMINISTERED BY THE UNITED STATES[1, 2, 3]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Puerto Rico:						
Cement, portland	1,390	W	1,300	W	936	W
Clays, common	96	547	75	437	54	328
Lime[e]	11	2,250	11	998	11	1,750
Salt	45	1,500	45	1,500	45	1,500
Stone, crushed	13,400	100,000	11,000 [r]	96,000 [r]	8,370	68,700
Total	XX	105,000	XX	98,900 [r]	XX	72,300
Administered Islands:						
American Samoa, stone, crushed	W	W	W	W	W	W
Guam, stone, crushed	329	3,760	325	3,780	296	3,380
Virgin Islands, stone, crushed	W	W	W	W	W	W
Total	XX	3,760	XX	3,780	XX	3,380

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

[1]Table includes data available through July 26, 2011.

[2]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[3]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 7

U.S. EXPORTS OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value	Quantity	Value
Metals:					
Aluminum:					
Crude and semicrude	metric tons	3,280,000	9,020,000	2,710,000	5,910,000
Manufactures	do.	150,000	683,000	122,000	479,000
Antimony:					
Metal, alloys, waste and scrap	do.	366	1,360 r	385	2,000
Oxide, antimony content	do.	1,830	10,200	1,710	9,660
Arsenic metal, arsenic content	do.	1,050	2,110	354	793
Bauxite and alumina:					
Alumina, calcined equivalent		1,150	684,000	946	488,000
Bauxite:					
Calcined, refractory and other grade		10	1,600	21	10,900
Crude and dried		14	4,000 r	20	5,580
Specialty aluminum compounds, sulfate, chloride, fluoride-based	metric tons	41,600	50,400	28,500	32,500
Beryllium, unwrought, and waste and scrap, other including articles not elsewhere specified, beryllium content	kilograms	113,000	16,500	22,900	11,700
Bismuth, metal, alloys, waste and scrap, bismuth content	do.	375,000	6,730	397,000	5,820
Cadmium:					
Metal	do.	126,000	901	249,000	537
Sulfide, gross weight	do.	241,000	125	16,200	8
Unwrought and powder	do.	295,000	1,370	276,000	1,270
Waste and scrap	do.	--	--	137,000	319
Chromium:					
Ores and concentrate	metric tons	7,000	4,370	2,500	1,610
Metals and alloys:					
Metal, unwrought powders, waste and scrap, other	do.	998	20,400	411	13,300
Ferroalloys, high-carbon, low-carbon, ferrochromium-silicon	do.	24,500	43,100	4,780	6,820
Chemicals:					
Oxide, trioxide, other	do.	21,000	38,900	12,000	27,900
Sulfates	do.	52	362	16	114
Salts of oxometallic or peroxometallic acids, zinc and lead chromate, sodium dichromate, potassium dichromate, other	do.	32,800	31,200	20,500	23,100
Pigments and preparations	do.	1,230	10,600	1,220	13,800
Cobalt:					
Acetates and chlorides	do.	346	6,320	658	8,370
Oxides and hydroxides	do.	531	19,400	225	5,550
Metal:					
Unwrought, powders, waste and scrap, mattes, other intermediate products of metallurgy	do.	2,380	112,000	2,120	77,300
Wrought and cobalt articles	do.	1,370	104,000	NA	NA
Copper:					
Unmanufactured, does not include unalloyed scrap, copper content	do.	407,000	1,920,000	299,000	1,280,000
Semimanufactures	do.	222,000	1,870,000	194,000	1,140,000
Scrap, alloyed and unalloyed	do.	908,000	2,960,000	843,000	2,010,000
Ferroalloys not listed elsewhere:					
Ferrophosphorous	do.	2,350	4,590	1,130	2,080
Other	do.	9,360	16,300	3,130	6,840
Gold:					
Ores and concentrates	kilograms	2,430	52,300	2,160	48,600
Dore and precipitates	do.	106,000	3,000,000	97,400	3,000,000
Bullion, refined	do.	459,000 r	13,100,000	281,000	8,760,000
Waste and scrap	do.	886,000	1,970,000	728,000	1,750,000

See footnotes at end of table.

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TABLE 7—Continued

U.S. EXPORTS OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value	Quantity	Value
Metals—Continued:					
Gold—Continued:					
Metal powder	kilograms	1,210	25,300	329	8,460
Compounds	do.	2,920,000	67,900	2,680,000	64,600
Iron and steel:					
Steel mill products		12,200	NA	8,420	NA
Fabricated steel products		1,900	NA	1,560	NA
Cast iron and steel products		304	NA	238	NA
Iron and steel scrap:					
Ferrous, includes tinplate and terneplate, excludes used rails for rerolling and other uses and ships, boats, and other vessels for scrapping		21,500	10,400,000	22,400	7,120,000
Pig iron, all grades		51	11,400	11	4,200
Direct-reduced iron, steelmaking grade	metric tons	804	97	271	38
Ships, boats, and other vessels for scrapping		4	354	4	773
Used rails for rerolling and other uses, includes mixed (used plus new) rails		76	54,900	59	38,700
Iron ore		11,100	1,240,000	3,920	356,000
Lead:					
Base bullion, lead content	metric tons	614	2,040	34	113
Ore and concentrates, lead content	do.	277,000	243,000	287,000	275,000
Unwrought and alloys, lead content	do.	68,100	119,000	77,600	80,100
Wrought and alloys, lead content	do.	6,150	9,880	4,310	8,280
Scrap, gross weight	do.	175,000	92,800	140,000	72,000
Magnesium:					
Waste and scrap, magnesium content	do.	2,600	5,420	2,280	5,200
Metal, magnesium content	do.	3,100	9,770	6,120	20,500
Alloys, gross weight	do.	6,760	29,900	9,190	40,400
Powder, sheets, tubing, ribbons, wire, other forms, gross weight	do.	1,950	30,200	2,050	30,500
Manganese, gross weight:					
Ores and concentrates with 20% or more manganese	do.	48,300	10,700	15,300	3,830
Ferromanganese, all grades	do.	23,400	20,600	24,200	27,900
Silicomanganese	do.	7,140	9,020	18,800	17,500
Metal, including alloys and waste and scrap	do.	4,580	11,600	3,470	9,040
Dioxide	do.	11,000	14,600	8,420	13,400
Mercury:					
Metal	do.	732	10,100	753	10,300
Amalgams of precious metals whether or not chemically defined	do.	925	564,000	154	238,000
Molybdenum:					
Ore and concentrates, including roasted and other, molybdenum content	do.	32,700	1,810,000	29,600	631,000
Chemicals:					
Oxides and hydroxides, gross weight	do.	16,700	428,000	10,600	159,000
Molybdates, all, gross weight	do.	1,540	46,700	1,500	18,000
Ferromolybdenum, molybdenum content	do.	1,290	62,400	827	22,400
Other, includes powders, unwrought, bars and rods, waste and scrap, wire, other, gross weight	do.	2,190	192,000	1,790	112,000
Nickel, nickel content:					
Primary, unwrought and chemicals	do.	11,600	345,000	7,020	313,000
Secondary, stainless steel scrap and waste and scrap	do.	94,600	1,340,000	90,000	814,000
Wrought, not alloyed, bars, rods, profiles, wire, sheets, strip, foil, tubes, pipes	do.	1,700	45,500	975	24,200
Alloyed, unwrought ingot, bars, rods, profiles, wire, sheets, strip, foil, tubes, pipes, other alloyed articles, gross weight	do.	42,100	1,730,000	30,700	1,120,000

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TABLE 7—Continued

U.S. EXPORTS OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008 Quantity	2008 Value	2009 Quantity	2009 Value
Metals—Continued:					
Niobium (columbium) and tantalum:					
Niobium:					
Ores and concentrates	kilograms	62,800	2,010	17,000	954
Ferroniobium	do.	1,130,000	12,500	240,000	2,740
Tantalum:					
Ores and concentrates, includes synthetic	do.	277,000	2,790	318,000	2,900
Unwrought powders, waste and scrap, unwrought alloys and metal	do.	462,000	89,800	179,000	50,100
Wrought	do.	104,000	49,300	52,200	26,900
Platinum-group metals:					
Palladium, palladium content	do.	26,400	197,000	30,300	229,000
Platinum, includes waste and scrap and metal, platinum content	do.	70,300	1,760,000	47,100	1,040,000
Iridium, osmium, ruthenium, gross weight	do.	6,450	80,600	4,020	34,400
Rhodium, rhodium content	do.	1,980	302,000	1,220	48,400
Rare earths, estimated rare-earth oxide content:					
Cerium compounds	do.	1,380,000	12,200	840,000	8,040
Compounds, inorganic and organic	do.	663,000	7,610	455,000	6,210
Metals, including scandium and yttrium	do.	1,390,000	18,600	4,920,000	15,700
Ferrocerium and other pyrophoric alloys	do.	4,490,000	21,200	2,970,000	28,000
Selenium and tellurium:					
Selenium, selenium content	do.	545,000	8,920	613,000	10,300
Tellurium, tellurium content	do.	50,000	3,030	8,130	1,210
Silicon, gross weight:					
Ferrosilicon	metric tons	17,700	29,500 r	14,200	16,900
Metal	do.	35,400	2,260,000	37,900	2,070,000
Silver:					
Bullion, silver content	kilograms	413,000	203,000	167,000	93,600
Dore, silver content	do.	94,800	36,200	130,000	72,700
Metal powder, gross weight	do.	890,000	473,000	834,000	434,000
Nitrate, gross weight	do.	34,900	3,260	27,900	2,690
Ores and concentrates, silver content	do.	130,000	50,300	122,000	55,400
Semimanufactured forms containing 99.5% or more by weight of silver, gross weight	do.	720,000	199,000	525,000	252,000
Waste and scrap, gross weight	do.	2,570,000	4,290,000	2,480,000	4,300,000
Unwrought, other, gross weight	do.	47,700	15,700	59,000	21,200
Thorium:					
Ore, monazite concentrate	do.	--	--	18,000	269
Thorium and thorium-bearing materials, compounds	do.	12,700	1,250	4,730	379
Tin:					
Ingots and pigs	metric tons	9,800	62,000	3,170	22,200
Tin scrap and other tin bearing material, except tinplate scrap, includes rods, profiles, wire, powders, flakes, tubes, pipes	do.	14,500	65,600	11,600	46,200
Tinplate and terneplate	do.	247,000	192,000	224,000	175,000
Titanium:					
Metal, waste and scrap, unwrought, wrought products and castings, ferrotitanium and ferrosilicon titanium	do.	34,600	1,290,000	23,300	799,000
Ores and concentrates	do.	14,900	8,590	14,800	8,230
Pigment, dioxide and oxide	do.	733,000	1,470,000	649,000	1,310,000
Tungsten, tungsten content:					
Ammonium paratungstate	do.	621	10,100	375	5,990
Carbide powder	do.	1,340	53,300	469	19,600
Metal powders	do.	981 e	57,100	361 e	25,500

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TABLE 7—Continued

U.S. EXPORTS OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value	Quantity	Value
Metals—Continued:					
Tungsten, tungsten content—Continued:					
Miscellaneous tungsten-bearing materials, ferrotungsten, ferrosilicon tungsten, unwrought, waste and scrap, wrought, compounds	metric tons	2,540	84,200	1,520	48,600
Ores and concentrates	do.	496 e	14,500	38 e	1,080
Vanadium:					
Aluminum-vanadium master alloy, gross weight	kilograms	21,900,000	76,200	11,200,000	27,800
Ferrovanadium, vanadium content	do.	281,000	12,600	672,000	15,000
Metal, including waste and scrap, gross weight	do.	57,100	3,740	22,700	1,040
Pentoxide, anhydride, vanadium content	do.	249,000	5,650	401,000	4,970
Other oxides and hydroxides, vanadium content	do.	1,040,000	11,300	506,000	5,270
Zinc:					
Compounds, chloride, chromates of zinc or of lead, compounds n.s.p.f.[3], lithopone, oxide, sulfate, sulfide, gross weight	metric tons	49,500	76,500	25,400	47,500
Ores and concentrates, zinc content	do.	725,000	598,000	785,000	656,000
Rolled	do.	4,970	20,900	6,160	17,700
Slab	do.	3,250	3,260	2,960	3,070
Zirconium:					
Ferrozirconium	do.	316	574	566	1,140
Ores and concentrates	do.	42,100 r	51,100	39,600	36,300
Oxide, includes germanium oxides and zirconium dioxides	do.	2,970	42,400	3,050	31,400
Unwrought powders	do.	344	10,400	165	7,660
Waste and scrap	do.	2,330	180,000	2,140	192,000
Total		XX	69,300,000 r	XX	49,100,000
Industrial Minerals:					
Abrasives, manufactured:					
Aluminum oxide, crude	metric tons	21,900	59,000	12,300	32,000
Metallic abrasives	do.	34,400	48,500	25,900	32,200
Silicon carbide, crude, ground and refined	do.	17,000	46,600	20,700	37,700
Asbestos, includes reexports:					
Manufactured		NA	33,200	NA	24,500
Unmanufactured	metric tons	368	345	59	69
Barite, natural barium sulfate	do.	61,600	10,500	49,300	10,200
Boron minerals and compounds:					
Boric acid, includes orthoboric and anhydrous		303	165,000	171	109,000
Sodium borates		519	192,000	417	176,000
Bromine:					
Compounds, includes methyl bromine and ethylene dibromide, bromine content	metric tons	3,500 r	9,120 r	2,310	6,510
Elemental, gross weight	do.	6,140	7,100	3,810	5,930
Cement, hydraulic and clinker[4]		823	102,000	884	107,000
Clays:					
Ball		65	4,580	35	2,430
Bentonite		1,090	161,000	709	100,000
Fire		393	49,600	328	42,800
Fuller's earth		127	44,000 r	90	28,500
Kaolin		2,960	606,000	2,290	459,000
Other, n.e.c.[5], includes chamotte or dinas earth, activated clays and earths, artificially activated clays		466 r	72,700 r	374	69,500
Diamond:					
Gemstones, natural, including reexports	thousand carats	34,000	14,700,000	25,200	9,940,000

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TABLE 7—Continued

U.S. EXPORTS OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value	Quantity	Value
Industrial minerals—Continued:					
Diamond—Continued:					
Industrial including exports and reexports:					
Unworked	thousand carats	1,280	28,000	947	17,500
Powder, dust and grit, natural and synthetic	do.	125,000	61,700	76,900	37,600
Diatomite		151	67,700	88	41,100
Feldspar	metric tons	14,600	2,390	7,520	1,150
Fluorspar	do.	18,800	3,340	14,100	2,230
Garnet, industrial	do.	12,500	9,050	13,200	10,700
Graphite, natural and artificial	do.	62,800	182,000	46,400	130,000
Gypsum and gypsum products:					
Crude		149	20,500	156	16,000
Plasters		135	47,400	155	37,800
Boards		98	133,000	665	120,000
Other		XX	55,400	XX	50,200
Helium, Grade–A	million cubic meters	70	152,000	71	160,000
Iodine:					
Crude, resublimed	metric tons	950	17,400	1,160	22,900
Potassium iodide	do.	568	11,300	126	2,720
Iron oxide pigments and hydroxides:					
Pigment grade	do.	4,740	12,100	5,640	15,500
Other grade	do.	46,900	31,800	11,300	18,500
Kyanite, andalusite, sillimanite[e]		36	10,400	26	7,510
Lime		174	27,100	108	18,500
Lithium chemicals:					
Carbonate	metric tons	2,720	15,800 r	1,030	7,130
Hydroxide	do.	5,680	40,700 r	4,400	31,600
Magnesium compounds:					
Compounds, chlorides, hydroxide and peroxide, sulfates	do.	38,000	29,100	37,800 r	28,300
Magnesite, crude and processed:					
Caustic-calcined magnesia	do.	890	779	503	296
Dead-burned and fused magnesia	do.	22,100	13,100	8,390	5,950
Other magnesia	do.	18,100	18,900	12,700	13,500
Crude	do.	21,000	3,350	10,500	1,480
Mica:					
Scrap and flake:					
Powder	metric tons	6,630	7,810	5,940	8,850
Waste	do.	2,430	731	2,090	1,600
Sheet:					
Unworked	do.	105	238	96	437
Worked	do.	1,920	18,600	1,020	15,300
Nitrogen, major compounds, gross weight		9,370	NA	9,280	NA
Peat		186	17,800	77	8,570
Perlite, crude[e]	metric tons	37,000	NA	33,000	NA
Potash:					
Potassium chloride	do.	104,000	NA	342,000	NA
Potassium sulfates, all grades	do.	585,000	NA	355,000	NA
Potassium nitrate	do.	5,090	6,050	8,450	6,250
Pumice and pumicite		15	7,220	11	5,100
Salt		1,030	65,900	1,450	74,100

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TABLE 7—Continued

U.S. EXPORTS OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value	Quantity	Value
Industrial minerals—Continued:					
Sand and gravel:					
Construction:					
Sand		98	18,000	79	19,000
Gravel		294	4,380	360	4,050
Industrial		3,100	260,000	2,150	175,000
Silica, special stone products		NA	8,730 r	NA	7,640
Soda ash		5,370	939,000	4,410	838,000
Stone:					
Crushed		1,240	61,600	1,260	58,300
Dimension		XX	65,700	XX	48,300
Strontium compounds:					
Carbonate, precipitated	kilograms	118,000	114	160,000	107
Oxide, hydroxide, peroxide	do.	749,000 r	641 r	615,000	358
Sulfur:					
Elemental		953 r	272,000	1,430	82,200
Sulfuric acid, 100% H_2SO_4	metric tons	262,000	42,700	254,000	23,900
Talc, excludes powders–talcum (in package), face, compact		244	46,000	188	37,600
Vermiculite[e]		5	985	3	610
Wollastonite[e]	metric tons	30,000	9,000	35,000	10,700
Zeolites[e]	do.	200	46	200	47
Total		XX	19,100,000 r	XX	13,400,000
Grand total		XX	88,400,000 r	XX	62,500,000

[e]Estimated. [r]Revised. do. Ditto. NA Not available. XX Not applicable. -- Zero.

[1]Table includes data available through July 26, 2011.

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Not specifically provided for.

[4]Excludes Puerto Rico.

[5]Not elsewhere classified.

*Correction posted September 21, 2011.

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TABLE 8

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value[3]	Quantity	Value[3]
Metals:					
Aluminum:					
Crude and semicrude	metric tons	4,200,000	12,500,000	4,110,000	7,980,000
Manufactures	do.	325,000	1,210,000	264,000	732,000
Antimony:					
Metal	do.	7,050	29,700	4,750	19,600
Ore and concentrate, antimony content	do.	164	828	167	1,010
Oxide, antimony content	do.	21,800	124,000	15,200	81,000
Arsenic:					
Acid	do.	115	682	3	11
Metal	do.	376	2,610	438	1,890
Sulfide	do.	(4)	11	77	334
Trioxide	do.	6,320	2,920	6,130	2,740
Bauxite and alumina:					
Alumina, calcined equivalent		2,530	1,100,000	1,860	613,000
Bauxite:					
Calcined, refractory and other grade		1,110	178,000	461	91,800
Crude and dried		10,500	277,000	6,970	208,000
Specialty aluminum compounds, sulfate, chloride, fluoride-based	metric tons	62,000	72,400	30,700	30,600
Beryllium, ore, concentrates, oxide, hydroxide, unwrought including powders, waste and scrap, other, beryllium-copper master alloys, beryllium-copper plates, sheets, strip, beryllium content	kilograms	77,600 r	20,500	23,800	5,720
Bismuth, metallic	do.	1,930,000	44,700	1,250,000	20,600
Cadmium:					
Metal	do.	44,000	565	4,940	371
Sulfide, gross weight	do.	439,000	3,040	135,000	2,430
Unwrought and powder	do.	153,000	5,090	117,000	1,110
Chromium:					
Chromite ore	metric tons	197,000	44,800	77,200	17,500
Metals and alloys:					
Ferroalloys, high-carbon, low-carbon, ferrochromium-silicon	do.	533,000	1,170,000	248,000	294,000
Metal, unwrought powders, waste and scrap, other	do.	13,100	145,000	7,570	74,900
Chemicals:					
Oxides, hydroxides, trioxide and other	do.	11,400	32,300	9,100	28,000
Sulfates	do.	56	92	71	88
Salts of oxometallic or peroxometallic acids, zinc and lead chromate, sodium dichromate, potassium dichromate, other	do.	33,600	30,800	15,300	18,100
Carbide	do.	129	2,460	165	3,060
Pigments and preparations based on chromium	do.	2,100	10,700	1,700	8,650
Cobalt:					
Metal:					
Alloys, unwrought, waste and scrap, wrought, cobalt articles	do.	1,570	59,400	NA	NA
Unwrought, excluding alloys and waste and scrap, includes cathode and metal powder, may include intermediate products of cobalt metallurgy	do.	8,430	618,000	5,870	198,000
Oxide and hydroxides	do.	1,110	63,400	1,460	37,500
Other forms, includes acetates, carbonates, chlorides, sulfates	do.	4,710	49,900	2,130	27,300
Copper:					
Unmanufactured, does not include unalloyed scrap, copper content	do.	848,000	6,210,000	733,000	3,510,000
Semimanufactures	do.	301,000	2,090,000 r	225,000	1,050,000
Scrap, alloyed and unalloyed	do.	106,000 r	485,000	71,800	237,000

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TABLE 8—Continued

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008 Quantity	2008 Value[3]	2009 Quantity	2009 Value[3]
Metals—Continued:					
Ferroalloys not listed elsewhere:					
Ferrophosphorus	metric tons	10,200	7,530	138	617
Other	do.	12,900	36,700	4,710	13,900
Gallium:					
Unwrought and waste and scrap	kilograms	41,100	18,500	35,900	12,600
Gallium arsenide wafers, doped and undoped	do.	166,000	155,000	145,000	131,000
Germanium, wrought, unwrought, waste and scrap, gross weight	do.	40,200	39,600		
Gold:					
Ores and concentrates	kilograms	27,500	15,700	29,400 e	39,100 e
Dore and precipitates	do.	85,100	1,830,000	146,000	4,260,000
Bullion, refined	do.	118,000	3,190,000	127,000	3,580,000
Waste and scrap	do.	36,500	485,000	43,400	589,000
Metal powder	do.	324	6,620	476	8,760
Compounds	do.	102,000	2,210	64,300	1,430
Indium, unwrought metal	do.	144,000	69,500	105,000	35,200
Iron and steel:					
Steel mill products		29,000	NA	14,700	NA
Fabricated steel products		5,220 r	NA	3,530	NA
Cast iron and steel products		777	NA	464	NA
Stainless steel	metric tons	586,000	NA	345,000	NA
Iron and steel scrap:					
Ferrous, includes tinplate and terneplate, excludes used rails for rerolling and other uses and ships, boats, and other vessels for scrapping		3,600	1,450,000	2,990	814,000
Pig iron, all grades		4,980	2,800,000	2,420	877,000
Direct-reduced iron, steelmaking grade		2,340	971,000	1,020	304,000
Ships, boats, and other vessels for scrapping		(4) r	18	(4)	79
Used rails for rerolling and other uses, includes mixed (used plus new) rails		151	80,600	57	17,700
Iron ore		9,250	918,000	3,870	376,000
Lead:					
Pigs and bars, lead content	metric tons	309,000	660,000	251,000	480,000
Pigments and compounds, lead content	do.	26,200	62,400	28,100	46,800
Scrap, reclaimed, includes ash and residues, lead content	do.	1,290	2,040	1,330	2,620
Wrought, all forms, including wire and powders, gross weight	do.	3,250	14,000	1,340	5,950
Magnesium:					
Waste and scrap, gross weight	do.	24,100	58,800	20,900	40,300
Metal, gross weight	do.	44,300	190,000	21,400	86,800
Alloys, magnesium content	do.	13,000	74,100	4,790	29,800
Powder, sheets, tubing, ribbons, wire, other forms, magnesium content	do.	1,970	14,700	205	4,170
Manganese:					
Ores and concentrates with 20% or more manganese, manganese content	do.	289,000	154,000	154,000	82,600
Ferromanganese, all grades, manganese content	do.	351,000	1,130,000	121,000	215,000
Silicomanganese, manganese content	do.	245,000	682,000	83,500	135,000
Metal, unwrought, other wrought, waste and scrap, gross weight	do.	31,700	116,000	23,000	57,800
Chemicals, manganese dioxide and potassium permanganate, gross weight	do.	23,600	39,600	18,600	45,800
Mercury:					
Metal	do.	155	1,700	206	1,350
Amalgams of precious metals whether or not chemically defined	do.	15	66,800	14	31,300

See footnotes at end of table.

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TABLE 8—Continued

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value[3]	Quantity	Value[3]
Metals—Continued:					
Molybdenum:					
Ores and concentrates, including roasted and other, molybdenum content	metric tons	10,200	512,000	7,520	150,000
Chemicals, gross weight:					
Oxides and hydroxides	do.	335	12,900	209	3,330
Molybdates, all, molybdenum content	do.	235 r	15,300	657	20,500
Orange	do.	373	3,110	269	2,170
Ferromolybdenum, molybdenum content	do.	2,320	166,000	2,030	50,100
Other, includes powders, unwrought, bars and rods, waste and scrap, wire, other, gross weight	do.	1,420	105,000	970	43,000
Nickel, nickel content:					
Primary, chemicals and unwrought	do.	129,000	3,200,000	99,900	1,480,000
Secondary, stainless steel scrap and waste and scrap	do.	20,100	427,000	17,700	249,000
Wrought, not alloyed, bars, rods, profiles, wire, sheets, strip, foil, tubes, pipes	do.	947 r	33,800 r	409	14,000
Alloyed, unwrought ingot, bars, rods, profiles, wire, sheets, strip, foil, tubes, pipes, other alloyed articles	do.	23,700 r	748,000 r	17,300	439,000
Niobium (columbium) and tantalum:					
Niobium:					
Ores and concentrates	kilograms	15,600	87	4,960	360
Oxide	do.	1,220,000	31,300	1,060,000	29,000
Ferroniobium	do.	11,000,000	245,000	4,490,000	109,000
Unwrought and powder	do.	1,130,000	47,500	699,000	24,100
Tantalum:					
Ores and concentrates, includes synthetic concentrates	do.	1,170,000	63,100	357,000	13,600
Unwrought powders, waste and scrap, unwrought alloys and metal	do.	833,000	113,000	613,000	92,800
Wrought	do.	101,000	23,200	75,600	20,800
Platinum-group metals, metal content:					
Platinum, grains and nuggets, sponge, other unwrought, other, waste and scrap, coins	do.	150,000	3,420,000	183,000	2,080,000
Palladium, unwrought and other	do.	120,000	1,350,000	69,700	631,000
Iridium, unwrought and other forms	do.	2,550	36,600	1,520	20,800
Osmium, unwrought	do.	11	101	68	551
Ruthenium, unwrought	do.	49,800	426,000	21,200	55,700
Rhodium, unwrought and other forms	do.	12,600	2,470,000	11,200	530,000
Rare earths, estimated equivalent rare-earth oxide (REO) content:					
Cerium compounds, including oxides, hydroxides, nitrates, sulfate chlorides, oxalates	do.	2,080,000	12,800	1,500,000	9,070
Yttrium compounds content by weight greater than 19% but less than 85% oxide equivalent	do.	9,920	6,770	6,920	565,000
Compounds, including oxides, hydroxides, nitrates, other compounds except chlorides	do.	8,810,000	119,000	5,120,000	67,500
Mixtures of REOs except cerium oxide	do.	2,390,000	22,600	4,750,000	23,500
Metals, whether intermixed or alloyed	do.	679,000	4,940	226,000	4,870
Mixtures of rare-earth chlorides, except cerium chloride	do.	1,310,000	17,600	411,000	4,930
Ferrocerium and other pyrophoric alloys	do.	125,000	2,380	102,000	2,620
Rhenium:					
Metal	do.	35,900	72,800	21,500	53,100
Ammonium perrhenate	do.	11,200 r	24,200	14,300	13,700
Selenium and tellurium:					
Selenium, selenium content:					
Selenium	do.	508,000	26,400	260,000	12,700
Dioxide	do.	11,000	958	3,420	210
Tellurium, tellurium content	do.	102,000	17,700	84,000	11,300

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TABLE 8—Continued

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value[3]	Quantity	Value[3]
Metals—Continued:					
Silicon, gross weight:					
Ferrosilicon	metric tons	281,000	395,000	103,000	126,000
Metal	do.	172,000	678,000	116,000	477,000
Silver:					
Ash and residues, silver content	kilograms	4,850	1,290 r	505	151
Bullion, silver content	do.	3,860,000	1,850,000	2,800,000	1,310,000
Dore, silver content	do.	574,000	717,000	653,000	439,000
Metal powder, gross weight	do.	61,000	8,870	247,000	36,400
Nitrate, gross weight	do.	10,700	4,280	835	241
Ores and concentrates, silver content	do.	32	31 r	87	9
Semimanufactured forms containing 99.5% or more by weight of silver, gross weight	do.	418,000	134,000	476,000	176,000
Waste and scrap, gross weight	do.	5,190,000	681,000	4,760,000	372,000
Unwrought, other, gross weight	do.	245,000	88,000	135,000	56,100
Thallium, unwrought powders, waste and scrap, other	do.	1,770	311	2,030	312
Thorium:					
Ore, monazite concentrate		--	--	26,000	20
Thorium and thorium-bearing materials, compounds	do.	692	121	2,250	275
Tin, gross weight:					
Compounds	metric tons	800	15,800	601	8,180
Dross, skimmings, scrap, residues, alloys, n.s.p.f.[5]	do.	24,200	33,300	81,300	23,400
Metal, unwrought	do.	36,300	636,000	33,000	404,000
Miscellaneous, includes tinfoil, tin powder, flitters, metallics, manufactures, n.s.p.f.[5]	do.	XX	71,100	XX	36,200
Tinplate and terneplate, gross weight	do.	292,000	271,000	295,000	366,000
Tinplate scrap, gross weight	do.	25,900	7,040	27,100	5,190
Titanium:					
Concentrate:					
Ilmenite	do.	433,000	68,600	250,000	21,800
Rutile, natural and synthetic	do.	487,000	232,000	279,000	141,000
Metal:					
Waste and scrap	do.	10,400	68,900	4,770	17,600
Unwrought	do.	23,900	278,000	16,600	178,000
Ingots	do.	1,340	36,800	531	13,300
Powder	do.	134	7,710	24	2,390
Other	do.	59	1,570	18	1,220
Wrought products and castings, includes bar, castings, foil, pipe, plate, profile, rod, sheet, strip, tube, wire, other	do.	8,350	349,000	6,930	292,000
Ferrotitanium and ferrosilicon titanium	do.	2,830	14,900	2,540	6,750
Pigment, dioxide and oxide	do.	183,000	393,000	175,000	385,000
Titaniferous iron ore	do.	140,000	44,600	10,000	532
Titaniferous slag	do.	461,000	187,000	414,000	168,000
Tungsten, tungsten content:					
Ammonium paratungstate	do.	2,510	66,700	2,540	52,600
Ferrotungsten and ferrosilicon tungsten	do.	309	10,500	46	1,260
Miscellaneous tungsten-bearing materials, metal powders, carbide powder, unwrought, waste and scrap, wrought, oxides, calcium tungstate, other tungstates, other compounds	do.	6,230	242,000	3,830	135,000
Ores and concentrates	do.	3,990	95,900	3,590	72,900

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TABLE 8—Continued

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value[3]	Quantity	Value[3]
Metals—Continued:					
Vanadium:					
Aluminum-vanadium master alloy, gross weight	kilograms	618,000	2,760	282,000	979
Ferrovanadium, vanadium content	do.	2,720,000 r	158,000	353,000	12,600
Metal, including waste and scrap, gross weight	do.	4,600	409	21,700	940
Miscellaneous chemicals, sulfates and vanadates, vanadium content	do.	189,000	4,350	231,000	3,570
Pentoxide, anhydride, vanadium content	do.	3,700,000	115,000	1,120,000	16,500
Vanadium-bearing ash and residues from the manufacture of iron and steel, vanadium oxide content	do.	1,040,000 r	18,000 r	791,000	12,300
Other oxides and hydroxides, vanadium content	do.	144,000	4,320	25,200	551
Zinc:					
Compounds, chloride, chromates of zinc or of lead, compounds n.s.p.f.[5], lithopone, oxide, sulfate, sulfide, gross weight	metric tons	161,000	248,000	104,000	127,000
Ores and concentrates, zinc content	do.	63,200	73,200	74,200	68,300
Rolled	do.	3,330	17,100	3,010	13,500
Slab, refined	do.	752,000	1,480,000	686,000	1,080,000
Zirconium and hafnium:					
Hafnium, unwrought, including powders	do.	12	3,850	5	2,080
Zirconium:					
Ferrozirconium	do.	129	594	(4)	7
Ores and concentrates	do.	34,400	30,200	14,400	17,100
Oxide, includes germanium oxides and zirconium oxides	do.	5,060	77,400	2,810	43,800
Unwrought powder	do.	94	2,790	22	1,890
Waste and scrap	do.	939	59,200	955	58,400
Total		XX	65,700,000	XX	41,300,000 r
Industrial minerals:					
Abrasives, manufactured:					
Aluminum oxide, crude, ground and refined	do.	285,000	175,000	64,200	53,700
Metallic abrasives	do.	36,600	28,300	15,800	12,100
Silicon carbide, crude, ground and refined	do.	127,000	149,000	78,000	74,500
Asbestos:					
Chrysotile and other unspecified type	metric tons	1,460	1,090	869	684
Products with basis of asbestos, cellulose, or other minerals		NA	19,500	NA	13,300
Barite:					
Chloride, oxide, hydroxide, peroxide, precipitated carbonate	metric tons	9,950	12,600	4,170	6,250
Crude	do.	1,920,000	160,000	572,000	30,000
Ground	do.	688,000	35,000	851,000	58,100
Other sulfates	do.	13,900	12,900	10,600	10,900
Boron minerals and compounds:					
Borax		1	566	(4)	376
Boric acid		50	26,200	36	26,100
Colemanite		30	8,880	31	8,630
Ulexite		75	22,600	28	11,300
Bromine:					
Compounds, contained bromine	metric tons	39,300 r	95,100 r	32,800	80,300
Elemental	do.	1,950	2,280	1,390	3,020
Cement, hydraulic and clinker[6]		11,400	779,000	6,770	502,000

See footnotes at end of table.

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TABLE 8—Continued

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value[3]	Quantity	Value[3]
Industrial minerals—Continued:					
Clays:					
China clay or kaolin		194	46,100	281	68,700
Fire clay		(4) r	79 r	(4)	133
Decolorizing earths and fuller's earth		1	100	1	96
Bentonite		7	2,670 r	8	2,460
Other clay		5 r	3,230	8	3,940
Chamotte or dina's earth		(4) r	42 r	(4)	165
Artificially activated clay and activated earth		30 r	34,400 r	27	28,800
Diamond, industrial:					
Diamond stones, natural and miners'	thousand carats	3,220	41,500	1,400	18,700
Powder, dust and grit, natural and synthetic	do.	492,000	75,400	246,000	40,800
Diatomite, siliceous fossil meals	metric tons	2,890	1,140	1,260	1,080
Feldspar and nepheline syenite:					
Feldspar	do.	2,030	646	2,120	646
Nepheline syenite	do.	321,000	35,000	308,000	36,800
Fluorspar:					
Aluminum fluoride	do.	47,600	69,400	18,700	26,800
Cryolite	do.	7,650	8,180	2,830	3,630
Fluorspar	do.	572,000	133,000	475,000	105,000
Hydrofluoric acid	do.	133,000	172,000	114,000	161,000
Garnet, industrial	do.	49,200	11,500	37,900	8,890
Gemstones		XX	20,900,000	XX	13,300,000
Graphite:					
Natural	metric tons	58,300	48,100	33,100	29,700
Electric furnace electrodes	do.	98,100	303,000	50,600	190,000
Gypsum:					
Crude		7,330	93,400	4,220	52,900
Plasters		13	7,240	15	6,800
Boards		306	50,600	236	38,500
Other		XX	43,400	XX	30,300
Iodine:					
Crude	metric tons	6,300	144,000	5,190	133,000
Potassium iodide	do.	564	12,100	259	6,000
Iron oxide pigments:					
Natural	do.	4,700	2,640	1,900	1,070
Synthetic	do.	151,000	161,000	105,000	126,000
Kyanite, andalusite, sillimanite	do.	5,580	1,930	4,880	2,060
Lime		307	39,400	422	53,200
Lithium chemicals:					
Carbonate	metric tons	15,800	70,100	9,250	41,900
Hydroxide	do.	1,160	7,400	932	5,580
Magnesium compounds:					
Compounds, chlorides, hydroxide, peroxide, sulfates	do.	162,000	48,700 r	133,000	38,500
Magnesite, crude and processed:					
Caustic-calcined magnesia	do.	167,000	40,400	126,000	37,700
Dead-burned and fused magnesia	do.	386,000	190,000	151,000	72,200
Other magnesia	do.	13,900	14,000	8,740	8,750
Crude	do.	15,800	5,720	6,270	3,830

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TABLE 8—Continued

U.S. IMPORTS FOR CONSUMPTION OF PRINCIPAL MINERALS AND PRODUCTS, EXCLUDING MINERAL FUELS[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral or product		2008		2009	
		Quantity	Value[3]	Quantity	Value[3]
Industrial minerals—Continued:					
Mica:					
Scrap and flake:					
Powder	metric tons	23,400	12,300	16,900	9,540
Waste	do.	3,560	1,470	2,990	1,670
Sheet:					
Unworked	do.	130	465	23	142
Worked	do.	1,750	17,900	1,020	14,400
Nitrogen, major compounds, gross weight		21,500	8,810,000	12,600	3,570,000
Peat moss	metric tons	936,000	228,000	906,000	230,000
Perlite, processed crude	do.	187,000	24,700	153,000	15,900
Phosphate rock and phosphatic materials		4,860	692,000	92	348,000
Potash, chloride, sulfate, nitrate, sodium nitrate mixtures	metric tons	9,560,000	3,080,000 r	3,670,000	1,780,000
Pumice:					
Crude or unmanufactured	do.	65,000	2,890	26,000	784
Wholly or partially manufactured	do.	436	1,890	258	832
Salt		13,800	282,000	14,700	337,000
Sand and gravel:					
Construction		5,430	114,000 7	2,980	66,100 7
Industrial		355	23,500	95	8,080
Silica, special stone products		NA	9,320 r	NA	8,320
Soda ash		13	3,820	6	2,350
Stone:					
Crushed, chips, calcium carbonate fines, excludes precipitated carbonates		20,900	232,000 7	12,200	174,000 7
Dimension		XX	2,150,000	XX	1,350,000
Strontium:					
Carbonate	kilograms	12,700,000	8,560	7,820,000	5,090
Celestite	do.	4,620,000	295	14,600,000	690
Metal	do.	170,000	791	70,100	564
Nitrate	do.	3,890,000	4,430	2,770,000	2,770
Oxide, hydroxide, peroxide	do.	106,000	152	6,720	51
Sulfur:					
Elemental		3,000 e	753,000	1,700 e	54,100
Sulfuric acid, 100% H_2SO_4	metric tons	5,180,000 r	468,000 r	1,260,000	146,000
Talc, unmanufactured		193	56,400	120	47,900
Vermiculite[e]		73	12,600	39	7,100
Wollastonite[e]	metric tons	5,000	650	4,000	530
Zeolites[e]	do.	200	42	300	64
Total		XX	41,300,000 r	XX	23,800,000
Grand total		XX	107,000,000	XX	65,000,000

[e]Estimated. [r]Revised. do. Ditto. NA Not available. XX Not applicable. -- Zero.

[1]Table includes data available through July 26, 2011.

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Customs value unless otherwise specified.

[4]Less than ½ unit.

[5]Not specifically provided for.

[6]Excludes Puerto Rico.

[7]Cost, insurance, and freight value.

*Correction posted September 21, 2011.

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TABLE 9

WORLD AND U.S. PRODUCTION OF SELECTED NONFUEL MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Mineral or product		World total					United States	
		2005	2006	2007	2008	2009	2009	Percentage of world total
Metals:								
Alumina		65,000 r	72,300 r	77,700 r	82,600 r	76,400	3,060	4.0
Aluminum[2]		33,900 r	38,000 r	39,600 r	36,900 r	40,800	1,730	4.2
Antimony	metric tons	172,000	173,000 r	180,000	182,000 r	155,000	--	--
Arsenic trioxide[3]	do.	60,000	61,100	55,700	53,600 r	54,400	--	--
Bauxite[3, 4, 5]		178,000 r	193,000 r	204,000 r	211,000 r	199,000	NA	NA
Beryl[3]	metric tons	3,450	4,360	4,360	4,940 r	3,590	3,030	84.3
Bismuth, refinery	do.	13,900	15,300	15,500	15,400	15,100	--	--
Cadmium, refinery	do.	20,100	19,900	19,400	20,100 r	18,800	633	3.4
Chromite[3]		6,900 r	7,300 r	8,400 r	8,100 r	7,000	--	--
Cobalt, Co content:								
Mine	metric tons	65,200 r	68,900 r	71,500 r	76,300 r	72,300	--	--
Refinery	do.	54,100	53,800	53,300	57,200 r	59,800	--	--
Copper:								
Mine		15,000	15,100 r	15,500	15,400	15,900	1,180	7.4
Smelter		13,500 r	14,100 r	14,300	14,700	14,500	597	4.1
Refinery		16,600 r	17,300	17,900 r	18,300 r	18,400	1,160	6.3
Gold	kilograms	2,470,000	2,370,000	2,360,000 r	2,290,000 r	2,450,000	223,000	9.1
Indium, refinery	do.	607,000 r	636,000 r	620,000 r	601,000 r	546,000	--	--
Iron ore[3]		1,550,000	1,840,000	2,040,000	2,210,000 r	2,240,000	26,700	1.2
Iron and steel:								
Direct-reduced iron[2]		56,300	58,800 r	64,700 r	66,500 r	64,500	--	--
Pig iron[2]		802,000	881,000	955,000 r	931,000 r	935,000	19,000	2.0
Raw steel		1,140,000	1,250,000	1,350,000	1,330,000	1,240,000	59,400	4.8
Lead:								
Mine, Pb content	metric tons	3,470,000 r	3,590,000 r	3,690,000 r	3,860,000 r	3,860,000	406,000	10.5
Refinery	do.	7,660,000 r	7,970,000 r	8,250,000 r	8,700,000 r	8,820,000	1,210,000	13.8
Magnesium[5]		622	675	751	670 r	608	W	NA
Manganese ore[3]		31,000	33,200 r	35,100 r	38,100 r	33,600	--	--
Mercury[5]	metric tons	1,520	1,150	1,200	1,320	1,920	NA [6]	NA
Molybdenum, Mo content	do.	186,000 r	186,000	213,000	218,000 r	221,000	47,800 [7]	21.6
Nickel, Ni content:								
Mine	do.	1,460,000 r	1,570,000 r	1,670,000 r	1,560,000 r	1,400,000	--	--
Refinery	do.	1,310,000 r	1,350,000	1,440,000 r	1,400,000 r	1,380,000	--	--
Niobium (columbium)-tantalum concentrates[3]	do.	264,000 r	223,000 r	263,000 r	264,000 r	263,000	--	--
Platinum-group metals	kilograms	504,000 r	514,000	507,000 r	460,000 r	445,000	16,500	3.7
Rhenium	do.	47,300 r	46,700	47,500 r	54,900 r	46,200	5,580	12.1
Selenium[2, 5]	do.	2,020,000 r	2,160,000 r	2,250,000 r	2,220,000 r	2,280,000	W	NA
Silver	metric tons	20,800	20,300	21,000 r	21,300	21,800	1,250	5.7
Tellurium[2, 5]	kilograms	112,000 r	116,000 r	124,000 r	121,000 r	118,000	W	NA
Tin:								
Mine	metric tons	296,000 r	291,000 r	301,000 r	257,000 r	260,000	--	--
Smelter[8]	do.	344,000	339,000	346,000 r	322,000 r	342,000	11,100	3.2
Tungsten, W content	do.	59,500 r	56,000 r	54,100	62,200 r	61,300	W	NA
Vanadium	do.	56,400	57,900	58,500	56,400 r	54,100	--	--
Zinc:								
Mine, Zn content of concentrate and direct shipping ore		10,000 r	10,300	11,000	11,600 r	11,200	736	6.6
Smelter		10,300 r	10,800 r	11,400 r	11,700 r	11,400	203	1.8

See footnotes at end of table.

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TABLE 9--Continued

WORLD AND U.S. PRODUCTION OF SELECTED NONFUEL MINERAL COMMODITIES[1]

(Thousand metric tons unless otherwise specified)

Mineral or product		World total					United States	
		2005	2006	2007	2008	2009	2009	Percentage of world total
Industrial minerals:								
Asbestos	metric tons	2,210,000 r	2,150,000 r	2,240,000 r	2,150,000 r	2,070,000	--	--
Barite	do.	7,870,000 r	7,960,000 r	7,730,000 r	8,200,000 r	6,130,000	383,000 [9]	6.3
Boron minerals	do.	4,950,000	3,760,000	4,200,000 r	3,850,000 r	3,510,000	W	NA
Bromine	do.	654,000 r	669,000 r	408,000 r	412,000 r	375,000	W [9]	NA
Celesite	do.	509,000	524,000 r	518,000 r	656,000 r	402,000	--	--
Cement, hydraulic		2,350,000	2,610,000	2,810,000	2,850,000 r	3,040,000	64,900 [10]	2.1
Clays:								
Bentonite		11,200 r	11,400 r	11,300 r	11,600 r	9,700	3,650	37.7
Fuller's earth	metric tons	3,980,000	3,700,000	3,720,000	3,510,000 r	3,210,000	2,010,000	62.6
Kaolin		39,100 r	38,900 r	36,700 r	36,100	33,000	5,290	16.0
Diamond:								
Natural	thousand carats	183,000	175,000 r	170,000 r	154,000 r	129,000	--	--
Synthetic	do.	4,220,000 r	4,320,000 r	4,420,000 r	4,420,000 r	4,380,000	91,000	2.1
Diatomite	metric tons	1,960,000 r	2,150,000 r	1,970,000 r	2,070,000 r	1,870,000	575,000 [9]	30.8
Feldspar		16,800 r	20,500	21,500 r	22,800 r	19,800	550	2.8
Fluorspar	metric tons	5,360,000 r	5,660,000 r	5,720,000 r	5,990,000 r	5,460,000	--	--
Graphite, natural	do.	1,030,000	1,020,000	1,110,000 r	1,120,000	1,090,000	--	--
Gypsum		147,000 r	160,000 r	166,000 r	155,000 r	149,000	10,400	7.0
Iodine, crude	metric tons	26,500	26,700	26,300	26,500	28,500	W	NA
Iron oxide pigments	do.	1,070,000 r	1,020,000 r	1,070,000 r	1,050,000 r	890,000	W	NA
Kyanite and related minerals	do.	462,000 r	456,000 r	516,000	448,000 r	416,000	111,000 [11]	26.7
Lime		270,000 r	284,000 r	296,000 r	307,000 r	299,000	15,800 [9, 10]	5.3
Lithium	metric tons	344,000	394,000	381,000	387,000 r	301,000	W	NA
Magnesite, crude[5]		15,600 r	15,600 r	16,700 r	18,400 r	19,000	W	NA
Mica, including scrap and flake[12]	metric tons	359,000 r	385,000 r	387,000 r	379,000 r	315,000	50,100	15.9
Monazite[13]	do.	6,280 r	6,850 r	6,860 r	6,900	6,800	--	--
Nitrogen, N content of ammonia		122,000 r	126,000 r	131,000 r	130,000 r	130,000	7,700 [14]	5.9
Peat		26,000 r	25,700 r	25,600 r	24,900 r	25,000	609 [15]	2.4
Perlite	metric tons	1,790,000	1,800,000 r	1,750,000	1,790,000	1,650,000	348,000 [9]	21.1
Phosphate rock[3]		152,000 r	151,000 r	160,000 r	165,000 r	166,000	26,400	15.9
Potash, K_2O equivalent		33,800	30,400 r	35,700 r	34,500 r	20,800	720	3.4
Pumice		18,300 r	20,400 r	20,700	18,900 r	17,200	410 [9]	2.4
Rare earths	metric tons	122,000	137,000	124,000	128,000 r	132,000	--	--
Salt		249,000 r	259,000 r	259,000 r	264,000 r	276,000	46,100 [10]	16.7
Sand and gravel, industrial, silica		113,000 r	116,000 r	120,000 r	122,000 r	106,000	24,600 [9]	23.2
Soda ash, natural and manufactured		41,000 r	42,600	44,900	45,600 r	44,100	9,310 [16]	21.1
Sulfur, all forms		68,200 r	67,500 r	68,200 r	68,700 r	67,500	8,940	13.2
Talc and pyrophyllite[17]	metric tons	7,950,000 r	7,770,000 r	7,700,000 r	7,580,000 r	7,430,000	511,000	6.9
Titanium concentrates:[3]								
Ilmenite and leucoxene	metric tons	6,050,000	6,850,000 r	7,120,000 r	6,870,000 r	6,180,000	300,000 [18]	4.9
Rutile[5]	do.	377,000 r	515,000 r	604,000 r	628,000 r	577,000	(19)	NA
Vermiculite	do.	521,000	513,000	502,000 r	517,000 r	505,000	100,000 [20]	19.8
Zirconium	do.	1,060,000	1,210,000	1,380,000	1,270,000 r	1,160,000	W	NA

r Revised. do. Ditto. NA Not available. W Withheld to avoid disclosing company proprietary data; not included in "World total." -- Zero.

[1] Data are rounded to no more than three significant digits.

[2] Primary.

[3] Gross weight.

[4] Individual country figures that are included in the world total represent dried bauxite equivalent of crude ore, but for some countries available data are insufficient to permit this adjustment.

[5] "World total" for years listed does not include U.S. production.

[6] U.S. production of mercury is byproduct only.

[7] Listed in Molybdenum chapter (table 1) as production.

[8] Includes tin content of alloys made directly from ore.

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TABLE 9—Continued

WORLD AND U.S. PRODUCTION OF SELECTED NONFUEL MINERAL COMMODITIES[1]

[9]Quantity sold or used by producers.
[10]Includes Puerto Rico.
[11]Includes synthetic mullite.
[12]Excludes, if any, U.S. production of low-quality sericite and sheet mica.
[13]Monazite totals are rounded to two significant digits.
[14]Synthetic anhydrous ammonia; excludes coke oven byproduct ammonia.
[15]Horticultural use.
[16]U.S. production is natural only.
[17]Data for the United States exclude proprietary pyrophyllite production.
[18]Includes rutile to avoid disclosing company proprietary data. Rounded to one significant digit.
[19]Included with ilmenite to avoid disclosing company proprietary data; not included in "Total."
[20]Rounded to one significant digit.

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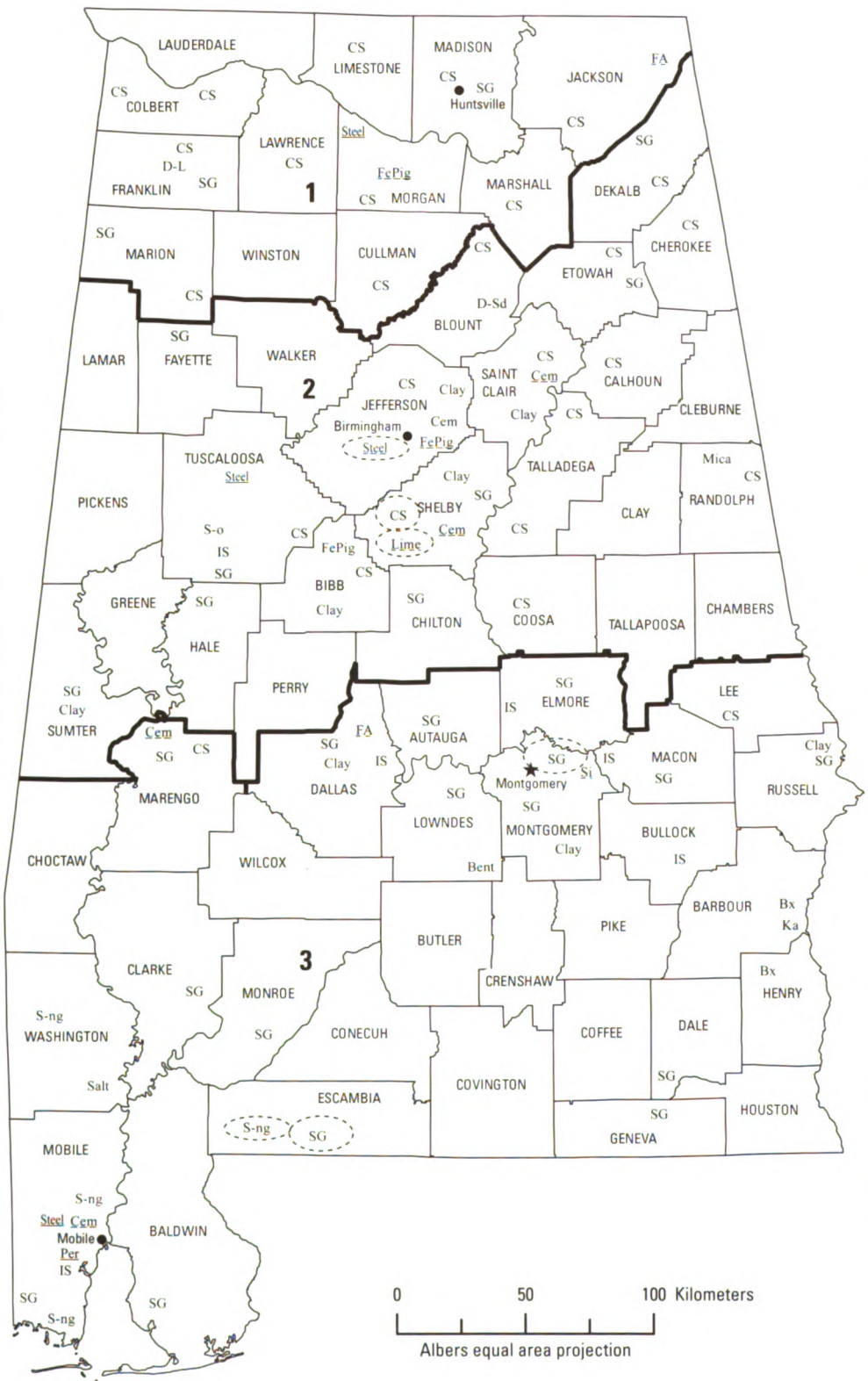
ALABAMA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Bent	Bentonite
Bx	Bauxite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-L	Dimension limestone
D-Sd	Dimension sandstone
FA	Ferroalloys plant
FePig	Iron oxide pigments
FePig	Iron oxide pigment plant
IS	Industrial sand
Ka	Kaolin
Lime	Lime plant
Mica	Mica
Per	Perlite plant
Salt	Salt
SG	Construction sand and gravel
Si	Silicon plant
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
Steel	Steel plant
	Concentration of mineral operations

Source: Geological Survey of Alabama/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF ALABAMA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Geological Survey of Alabama for collecting information on all nonfuel minerals.

In 2009, Alabama's nonfuel mineral production[1] was valued at $1.02 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $240 million, or a 19%, decrease compared with the State's total nonfuel mineral production value of $1.26 million in 2008, following a $70 million, or a 5%, decrease from $1.33 million in 2007. Although the State's total production value decreased from 2008 to 2009, the State rose to 17th from 18th in rank among the 50 States in total nonfuel mineral production value and accounted for 1.7% of the U.S. total.

The top five nonfuel mineral commodities produced in Alabama in 2009 were, in descending order of value, crushed stone, portland cement, lime, construction sand and gravel, and masonry cement. These five mineral commodities accounted for approximately 94% of the State's total nonfuel mineral production value; the combined value of the top three mineral commodities produced in the State—crushed stone, portland cement, and lime—accounted for 85% of the total production value. Only two mineral commodities increased in production value from 2008 to 2009, salt and crude iron oxide pigments (actual values withheld—company proprietary data), though the production of both of these mineral commodities decreased over the same time period.

The three largest decreases in production value took place with portland cement, crushed stone, and construction sand and gravel, down by $143 million, $38 million, and $23 million, respectively. The largest decrease in production took place with crushed stone, down by almost 14 million metric tons (Mt), from a total of 50 Mt in 2008 to 36 Mt in 2009. Construction sand and gravel followed, down by 3.8 Mt from almost 14 Mt in 2008 to almost 10 Mt in 2009, followed by portland cement, down by 1.2 Mt from 4.6 Mt to 3.4 Mt (table 1).

In 2009, the State remained second among the 33 lime-producing States, second of the three iron oxide-producing States, fourth in bentonite clay production, and eighth in salt production. The State increased to third from fourth in masonry cement production and to sixth from seventh in portland cement production. The State declined in rank to second from first in quantities of common clays produced and to 15th from 10th in gemstones (gemstones based upon value).

All metal production in the State, especially that of raw steel, was the result of the processing of materials acquired from other domestic and from foreign sources. Production of a natural mixture of bauxite (no longer used to produce primary aluminum) and bauxitic clay with very low iron oxide content has been reported to the USGS since 1995 as kaolin; it is primarily used to make refractory products. Iron oxide pigments were mined in Bibb, Jefferson, and Morgan Counties. Steel was produced in the Birmingham region and also at a facility in Etowah County.

The narrative information that follows was provided by the Geological Survey of Alabama[2] (GSA). The GSA production data and information, except where otherwise noted, were based upon the agency's own surveys and mine inquiries, company annual reports, and data and information derived from other State government agency sources. These data may differ from USGS annual production figures, which were based upon company responses to USGS surveys and upon USGS estimates.

Overview

In 2009, approximately 272 companies or operations were involved in the mining and production of industrial mineral resources in Alabama. The total numbers of reported operations are derived from information presented in the 2009 Annual Report—Statistical Supplement of the Mining and Reclamation Division of the Alabama Department of Industrial Relations and cover the time period of October 1, 2008, to September 30, 2009 (Alabama Department of Industrial Relations, 2009).

Commodity Review

Industrial Minerals

Clays.—Alabama had 35 active clay (bentonite, common clay, fire clay, fuller's earth, kaolin, and shale) operations in 2009, up from 23 in 2008. Clay production was led by common clay followed by shale, fuller's earth, bentonite, fire clay, and kaolin. Several industrial mineral mining operations, such as those of fire clay, sandstone, and shale, were related to the State's coal mining industry.

Sand and Gravel, Construction, and Sand and Gravel, Industrial.—In 2009, 157 sand and gravel operations (including both construction and industrial operations) were active in the State, an increase from 145 in 2008. Sand and gravel production came primarily from the mining of alluvium and terrace deposits in Elmore, Macon, Montgomery, Russell, and Tuscaloosa Counties, and from the Citronelle Formation in Mobile County.

Stone, Crushed.—The State had 54 limestone-dolomite operations for crushed stone in 2009, 4 fewer than in 2008. In addition, granite, sandstone, and quartzite operations continued to produce crushed stone in the State. The GSA reported total crushed stone production at almost 31 million metric tons (more

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Lewis S. Dean, a Geologist in the Geologic Investigations Program at the Geological Survey of Alabama, authored the text of the State mineral industry information provided by that agency.

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than 34 million short tons) produced. Birmingham-based Vulcan Materials Co. remained the leading construction aggregate producer in the country.

Government Activities and Programs

In 2009, GSA continued to publish 1:24,000-scale geologic maps in conjunction with the Federal Government's STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP) through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers.

Alabama's geologic map information is used in a variety of ways, especially in the rapidly urbanizing portions of the State. New geologic mapping is critical in the State to help in delineating current economic mineral deposits and identifying mineral resources in the expanding market regions, such as the Shelby-Jefferson County area (the greater Birmingham area) and Tennessee River Valley area of northeast Alabama. For example, the mapping of these areas has helped in identifying geologic formations that potentially contain the industrial mineral resources of chert, common clay, crushed stone (limestone, dolomite, and sandstone), gravel, high-calcium limestone, sand, and shale, all of which support construction and infrastructure development. Published geologic 7.5-minute quadrangles during 2009 included the Stevenson and Hollywood quadrangles in the Jackson County area of the Appalachian Plateau region of northeast Alabama.

More information on geology, hydrology, mineral occurrence, mining history, and general economics of specific mineral resources in the State is available from the GSA. GSA contact information and other related geological information about the State is available over the Internet at http://www.gsa.state.al.us.

Additionally, the Alabama Department of Transportation (ADOT) maintains an annual maintenance and construction program for more than 17,000 kilometers (km) (approximately 11,000 miles) of highway. This work represents one of the largest uses for concrete, asphaltic and bituminous base, and construction aggregates (crushed stone and construction sand and gravel) in the State. An updated listing of approved sources of coarse and fine aggregates is available from ADOT at http://www.dot.state.al.us/mtweb/Testing/MSDSAR/doc/QMSD/Li01.pdf.

Reference Cited

Alabama Department of Industrial Relations—Mining and Reclamation Division, 2009, Annual report—Statistical summary: Birmingham, AL, Alabama Department of Industrial Relations, September 30, 46 p. (Accessed January 14, 2013, at http://dir.alabama.gov/Inspections/Mining/docs/2009_ANNUAL.pdf.)

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ALABAMA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	450	59,300 e	303	38,000 e	208	25,600 e
Portland	5,060	486,000 e	4,640	450,000 e	3,420	307,000 e
Clays, common	2,240	42,300	1,970	34,400	1,340	25,300
Gemstones, natural	NA	398	NA	398	NA	143
Lime	2,480	234,000	2,320	239,000	1,960	225,000
Sand and gravel:						
Construction	16,700	96,500	13,800 r	87,300 r	10,000	64,800
Industrial	459	9,810	619	14,600	370	11,200
Stone:						
Crushed	55,600	382,000	50,000	370,000 r	36,400	332,000
Dimension, marble and sandstone	W	W	7	3,720	4	1,460
Combined values of clays (bentonite, kaolin), iron oxide pigments (crude), mica [crude (2008–09)], salt, and values indicated by symbol W	XX	24,300	XX	26,700 r	XX	26,500
Total	XX	1,330,000	XX	1,260,000 r	XX	1,020,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
ALABAMA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	56 r	44,200 r	$326,000 r	55	30,400	$279,000
Marble	2	2,120	15,800	2	1,680	13,600
Sandstone & Quartzite	7	1,230	10,500 r	7	1,220	11,300
Granite	3	1,400	9,680	4	2,210	20,300
Slate	2	1,000	7,490	2	781	6,340
Miscellaneous stone	3	76	985 r	4	84	844
Total	XX	50,000	370,000 r	XX	36,400	332,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
ALABAMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	251	2,610
Filter stone	W	W
Other coarse aggregate	1,290	15,600
Coarse aggregate, graded:		
Concrete aggregate, coarse	714	6,530
Bituminous aggregate, coarse	1,170	9,960
Bituminous surface-treatment aggregate	W	W
Railroad ballast	757	7,280
Other graded coarse aggregate	4,280	42,400
Fine aggregate (-⅜ inch):		
Stone sand, concrete	141	1,550
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	86	695
Other fine aggregate	1,130	9,870
Coarse and fine aggregates:		
Graded road base or subbase	1,540	12,100
Unpaved road surface	246	1,520
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	298	2,620
Roofing granules	W	W
Other coarse and fine aggregates	5,510	63,200
Other construction materials	160	1,440
Agricultural:		
Limestone	184	1,750
Poultry grit and mineral food	W	W
Chemical and metallurgical:		
Cement manufacture	1,540	9,790
Lime manufacture	W	W
Sulfur oxide removal	W	W
Other miscellaneous uses and specified uses not listed	37	601
Unspecified:[2]		
Reported	4,920	46,800
Estimated	9,710	73,100
Total	36,400	332,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
ALABAMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	633	7,040	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregates[5]	2,340	20,200	3,980	38,100	W	W
Other construction materials	136	1,150	23	295	--	--
Agricultural[6]	W	W	W	W	--	--
Chemical and metallurgical[7]	--	--	W	W	--	--
Other miscellaneous uses	--	--	37	601	--	--
Unspecified:[8]						
Reported	1,030	11,700	2,870	25,700	1,020	9,360
Estimated	1,020	8,490	7,580	54,400	1,110	10,200
Total	8,910	81,900	22,700	192,000	4,810	58,200

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes riprap and jetty stone, filter stone, and other coarse aggregates.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surface, terrazzo and exposed aggregate, and other coarse and fine aggregates.

[6]Includes agricultural limestone and poultry grit and mineral food.

[7]Includes cement and lime manufacture, and sulfur oxide removal.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
ALABAMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)[2]	3,790	$21,900	$5.78
Concrete products (blocks, bricks, pipe, decorative, etc.)	74	989	13.36
Asphaltic concrete aggregates and other bituminous mixtures	377	3,730	9.89
Road base and coverings	123	1,330	10.81
Road and other stabilization (lime)	5	20	4.00
Fill	354	1,290	3.64
Other miscellaneous uses[3]	41	452	11.02
Unspecified:[4]			
Reported	407	2,690	6.61
Estimated	4,820	32,400	6.72
Total or average	10,000	64,800	6.48

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes golf course, filtration, and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

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TABLE 6

ALABAMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	W	W	2,680	14,900
Asphaltic concrete aggregates and road base materials[3]	W	W	W	W	431	4,200
Fill	1	3	4	53	349	1,230
Other miscellaneous uses[4]	839	5,980	440	3,100	28	292
Unspecified:[5]						
Reported	14	101	--	--	394	2,580
Estimated	--	--	655	5,310	4,160	27,100
Total	853	6,080	1,100	8,460	8,040	50,300

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes golf course, filtration, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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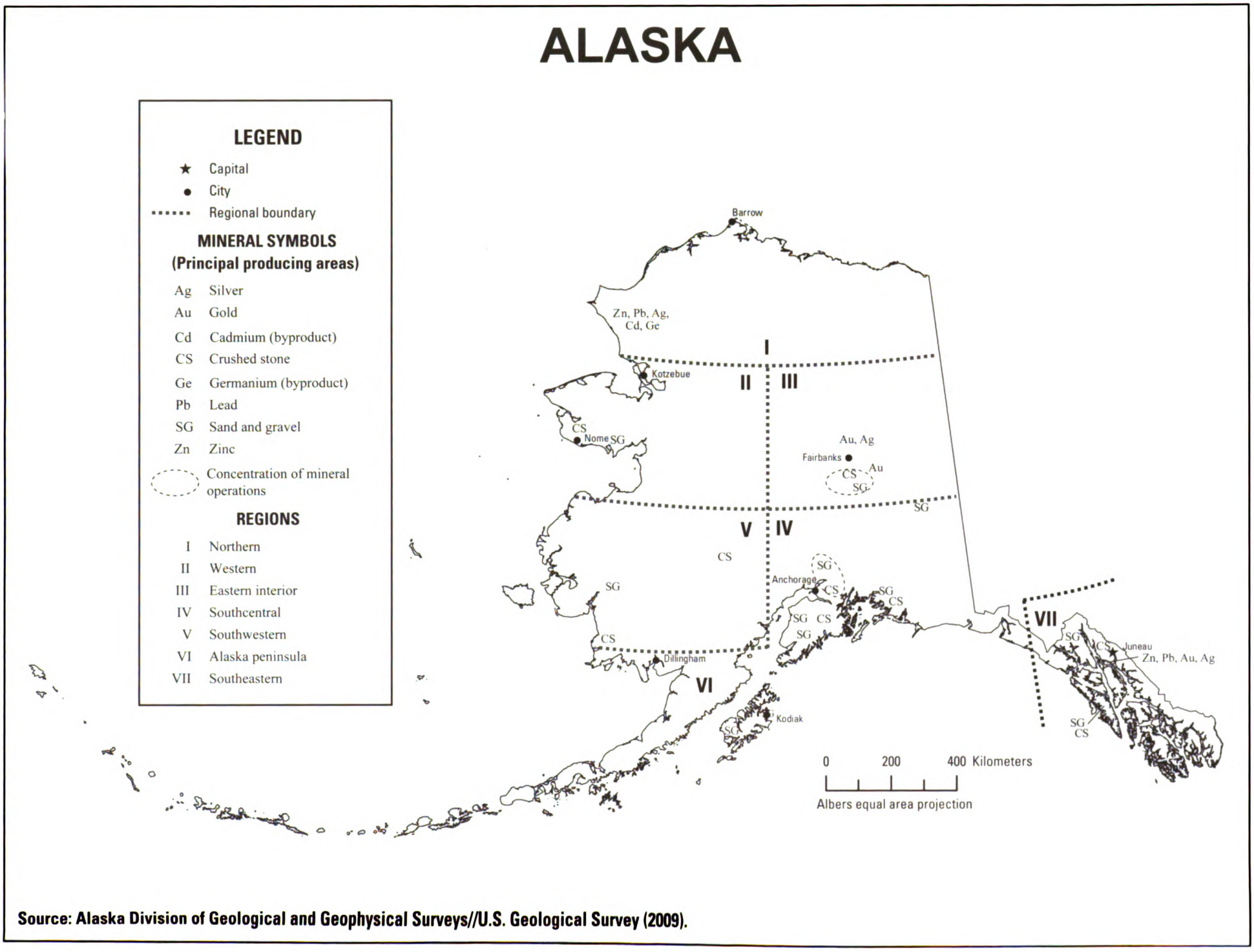
ALASKA



Source: Alaska Division of Geological and Geophysical Surveys//U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF ALASKA

In 2009, Alaska's nonfuel raw mineral production[1] was valued at $2.62 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $31 million, or about 1%, decrease from the State's total nonfuel mineral value of $2.65 billion in 2008, which followed an $889 million, or 25%, decrease from a total production value of $3.54 billion in 2007. The State rose to seventh from eighth among the 50 States in total nonfuel mineral production value and accounted for almost 4.5% of the U.S. total value, up from 3.7% in 2008. Per capita, the State led the Nation in the value of its mineral industry's nonfuel mineral production; with a population of 698,000, the value of production was about $3,750 per capita.

The States leading nonfuel mineral commodities in 2009 were, by production value, zinc, gold, lead, and silver. These four mineral commodities accounted for more than 96% of the total value of Alaska's nonfuel mineral production. Zinc continued to be the State's leading nonfuel raw mineral produced. Two commodities in 2009 increased in production value: gold, up by 13%, and crushed stone, up by 11%, or almost $3.5 million. All other mineral commodities decreased in production value (in descending order of value), most notably lead, down by 16%; construction sand and gravel, down by 35%, or $29.3 million; zinc, down by 1.5%; and silver, down by 0.6%. In 2009, the quantities of the five major metallic mineral commodities produced in Alaska increased: lead, up by 17%; cadmium and zinc, up by 12% each; and gold and silver, up by about 1% each. The production of crushed stone remained essentially the same as that of 2008, whereas the production of construction sand and gravel decreased by 4 million metric tons (Mt), or 36%.

In 2009, Alaska continued to rank first in the production of cadmium, among 6 producing States; silver, among 11 producing States; and, zinc, among 6 producing States. The State rose to first in the production of lead, among 5 producing States, and remained second in the production of gold, among 11 producing States.

The following narrative was derived from the annual publication of the Alaska Division of Geological and Geophysical Surveys (DGGS). The DGGS, in cooperation with the Alaska Department of Commerce, Community and Economic Development, Division of Economic Development, compiled the data, which are based on DGGS surveys and estimates and may differ from USGS production figures as reported to and estimated by the USGS.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

Employment

Total minerals industry employment in 2009 was estimated to be 3,280 full-time-equivalent jobs, a decrease of 112 jobs (3.3%) from the estimated 2008 total of almost 3,400 full-time-equivalent jobs. The largest change in employment compared to 2008 was the drop in mineral development jobs from approximately 520 to 370 in 2009, a 28% decrease. Exploration jobs also decreased from 550 jobs in 2008 to 420 in 2009, a 23% decrease. Mineral production employment increased significantly in 2009, with about 2,490 jobs across all production sectors in 2009 compared to 2,330 jobs in 2008. Lode gold mining jobs increased 13% in 2009, adding about 90 jobs. Placer gold mining employment also increased significantly in 2009, with about 120 full-time-equivalent jobs added to the 310 jobs estimated for 2008, a 39% increase. The high price of gold was the most significant factor in the increase of gold mining jobs and likely influenced the increase in recreational miners reported from 2008 to 2009. Full-time-equivalent jobs decreased in the base-metals sector by approximately 60 jobs, or 13%, from 2008 to 2009. Modest employment increases were seen in the polymetallic, and sand and gravel mining sectors.

The average monthly wage for mining in Alaska during 2009 was about $7,600, according to the Alaska Department of Labor & Workforce Development (DLWD), compared to an average monthly wage for all industries in Alaska of approximately $3,900. Mining jobs in Alaska have higher wages than any other industry except oil and gas. The average annual earnings for a mining job were $91,100 in 2009, according to DLWD. Employees in mining jobs were paid nearly twice the Alaskan average annual earnings of nearly $47,000 per year. Mining wages in Alaska totaled over $183 million in 2009.

The DLWD reported there were over 2,100 mining jobs in Alaska in 2009, with total employment in all industries in Alaska during 2009 over 320,000 jobs. Mining employment included almost 690 jobs in the Fairbanks North Star Borough, 380 jobs in the Municipality of Anchorage, and about 280 jobs in the City and Borough of Juneau. During the last 10 years, according to the DLWD, employment growth by Alaska's mining industry has outpaced growth of the United States' total mining industry employment by nearly 40%; expansions in Alaska's mining industry employment have also eclipsed employment growth in most of Alaska's other private industries. The DLWD statistics do not include the self-employed, such as the majority of placer operators; their employment data also often do not include jobs in the exploration and development phases of mining. Jobs in these mining phases are often grouped by the DLWD in the engineering, environmental, or construction industries. These omissions in employment data may result in lower estimates of the mining industry's contribution to the earnings and employment numbers in the State.

The DLWD reported the average monthly wage for metal mining in Alaska during 2009 was almost $7,800. They also report that the average employment during 2009 was about 1,770 full time equivalent jobs in metal mining, more than

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300 in coal mining and nonmetallic mineral mining and quarrying, and about 9,320 in support activities for mining, oil, and gas. Nonmetallic mineral product manufacturing provided nearly 330 jobs, including an average of about 320 jobs in cement and concrete manufacturing for 2009. Primary metal manufacturing provided 23 full time equivalent jobs, while metal and mineral merchant wholesalers provided an average of 114 jobs during 2009.

In 2009, the Greens Creek Mine, the Red Dog Mine, and the Pogo Mine were the largest employers in Juneau, the Northwest Arctic Borough, and Southeast Fairbanks Census Area respectively. Fort Knox Mine and Usibelli Coal Mine are both the third largest employers in their respective boroughs. Kensington Mine was expected to become one of the top 10 private employers in Juneau by 2011.

Exploration and Development Activities

Nonfuel mineral exploration expenditures during 2009 were approximately $180 million, 48% less than the nearly $350 million spent in 2008. The worldwide economic downturn limited the amount of venture capital available for mineral exploration. In general, gold exploration projects were funded preferentially to other exploration projects following the increasing gold price throughout the year. Exploration was conducted in Alaska for a wide variety of metals and mineralization styles during 2009. Gold, grouped with other precious metals, remained a major exploration commodity, but exploration expenditures for polymetallic deposits were also very strong and accounted for 48% of total exploration expenditures. Platinum-group-element exploration expenditures in 2009 were slightly above the average platinum-group-element expenditures from 2001 through 2008.

Copper-gold porphyry systems were the major exploration targets in 2009, with slightly more than $74 million in expenditures. In excess of $64 million was spent on intrusion-related gold deposits and more than $12 million was spent on various gold-quartz vein deposits. The sharp decrease in exploration expenditures for base-metal-rich, polymetallic massive-sulfide deposits was notable, with only $15 million spent in 2009, compared to more than $30 million spent in 2008 and almost $60 million spent in 2007. About $4.2 million was spent on platinum-group-element deposits and nickel-copper ultramafic-hosted deposits, and almost $9.3 million was spent on uranium, diamond, tin, coal, placer gold, and other deposit types, including significant expenditures exploring for iron- titanium-rich beach placer deposits. Analysis of 2009 mineral exploration expenditures indicates that 41% of funds was spent exploring for porphyry copper-gold-molybdenum deposits, 36% for intrusion-related gold deposits, 8% for various types of massive-sulfide deposits, 7% for gold-vein deposits, and the remainder for a wide variety of deposit types. These percentages are not significantly different than the 2008 values.

Exploration took place across Alaska with more than $99 million (55% of the exploration funds) spent in southwestern Alaska and $35 million spent in the eastern interior region. In the southwestern region, there was a sharp decrease in exploration spending compared to 2008. Exploration expenditures also dropped sharply in the northern region during 2009 compared to 2008; there were moderate decreases in the southcentral, eastern interior, and southeastern regions.

Exploration expenditures in the western region for 2009 increased 43% compared to 2008 expenditures. Two advanced exploration projects, Pebble and Donlin Creek, accounted for more than 50% of the exploration expenditures in 2009. The Pebble copper-gold porphyry project in southwestern Alaska, with resources of 33 Mt (72 billion pounds) of copper, 2.9 million kilograms (94 million troy ounces) of gold, and 2.2 Mt (4.8 billion pounds) of molybdenum, was a joint-venture project of Northern Dynasty Minerals Ltd. (Vancouver, British Columbia, Canada) and Anglo American PLC (London, England), and was the largest exploration project in 2009. The 1.1-million-kilogram (35.3-million-troy-ounce) Donlin Creek intrusion-hosted gold project in southwestern Alaska was a joint venture of Barrick Gold Corp. (Toronto, Ontario, Canada), NovaGold Resources Inc. (Vancouver, British Columbia, Canada), and Calista Corp. (Anchorage, Alaska).

New prospecting sites and mining claims were staked across the State in 2009, including almost 4,000 new State claims comprising about 200,000 hectares (ha) (494,000 acres), 40 new State prospecting sites comprising about 2,600 ha (6,400 acres), and about 1,060 new Federal claims comprising 8,500 ha (21,000 acres). State claim staking increased more than 7% from 2008 levels, while the number of new Federal mining claims decreased to 35% of the claims staked in 2008. The number of active Federal claims also decreased about 10% from 2008 to 2009. The amount of land in Alaska under claim increased approximately 13% from 2008 to 2009, with approximately 1.6 million ha (3.9 million acres) of land covered by claims and prospecting sites in 2009. Alaska had more than 10,400 active Federal and about 40,700 active State mining claims in 2009.

The development sector of the mining phases as used in this report refers to building infrastructure or activities that facilitate production of mineral products. Development expenditures refer to actual expenditures at mines as well as sustaining capital. Sustaining capital includes equipment replacement and rebuilding, facility upgrades, and other expenditures that must be amortized or depreciated in accordance with tax laws. Development expenditures for 2009, reported for 27 projects, totaled about $330 million, down 16.5% from the almost $400 million spent in 2008. Tailings storage facilities were expanded at the Red Dog Mine. All major underground development activities and surface facilities at Kensington, except the tailings facility, were completed in 2009. At the Fort Knox Mine, construction of the heap leach facilities continued, studies began regarding increasing the height of the tailings dam, and the final reclamation of the True North Gold Mine started. At the Nixon Fork Mine, an evaluation plan began, and a new resource estimate was expected in the fall of 2010. At the Greens Creek Mine, underground infill drilling and preliminary production expenditures were noted. The Rock Creek Mine continued in care and maintenance status. PacRim Coal LP continued environmental, permitting, and engineering work on the Chuitna Coal project near Anchorage.

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Commodity Review

Industrial Minerals

Sand and Gravel, Construction, and Stone, Crushed.—Production of crushed stone was 1.6 Mt (1.8 million short tons) in 2009, compared with 2.2 Mt in 2008. Sand and gravel production was 6.4 Mt (7 million short tons) down from 11 Mt in 2008. These data reflect some significant shortfalls in reporting for both construction sand and gravel and crushed stone production. Several large rock, and sand and gravel producers declined to contribute nonmandatory information; as a result, sand and gravel, and crushed stone estimates are very incomplete and are possibly quite low.

Metals

Gold.—Gold production (both hard-rock and placer) was nearly 24,300 kg (781,000 troy ounces). Hard-rock (lode) gold production decreased approximately 3% in 2009, to about 22,400 kg (720,000 troy ounces) from 23,100 kg (744,000 troy ounces) in 2008. The Pogo Mine was the largest producer of gold in Alaska with 12,100 kg (390,000 troy ounces) produced. Placer production in Alaska increased in 2009 to 1,880 kg (60,300 troy ounces), up more than 6% from 1,770 kg (56,800 troy ounces) in 2008. Approximately 234 placer gold operations reported production in Alaska in 2009 compared to 195 in 2008.

Lead, Silver, and Zinc.—Lead production was 152,000 t (167,000 short tons) and silver production was estimated at 485,000 kg (15.6 million troy ounces). Zinc production from all Alaskan producers totaled 635,000 t (700,000 short tons) in 2009.

Government Programs and Activities

The DGGS continued to be an active participant in the STATEMAP program. STATEMAP is a component of the congressionally-mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers.

In early 2009, the DGGS released airborne magnetic and electromagnetic geophysical maps for 114,000 ha (442 square miles) of the northern Chistochina mining district. During July 2009, geologists from the Mineral Resources Section of the DGGS conducted geologic mapping of about 29,000 ha (113 square miles) of the geophysical survey tract in the southern foothills of the Alaska Range, about 225 km (140 miles) southeast of Fairbanks and 32 km (20 miles) east of Paxson. The DGGS also conducted geologic fieldwork along the proposed gas pipeline corridor and the Alaska Highway from Tetlin Junction to the Yukon Territory-Alaska border. Surficial and bedrock mapping were completed at a scale of 1:63,360. The DGGS acquired airborne magnetic, electromagnetic, and radiometric geophysical data for approximately 168,000 ha (650 square miles) of mixed State-and Native-owned lands centered on Moran Creek and Moran Dome in the Tanana and Melozitna quadrangles. Survey data and maps for this area, about 240 km (150 miles) west- northwest of Fairbanks and 40 km (25 miles) west of the village of Tanana, were to be released in 2010.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ALASKA[1, 2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	13	NA	69	NA	69
Sand and gravel, construction	13,400 r	78,000 r	11,400 r	84,800 r	7,320	55,500
Stone, crushed	1,750	20,000	1,990 r	31,400 r	1,940	34,800
Combined values of cadmium (byproduct from zinc concentrates), gold, lead, silver, zinc	XX	3,440,000	XX	2,540,000	XX	2,530,000
Total	XX	3,540,000	XX	2,650,000 r	XX	2,620,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2

ALASKA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008[r] Number of quarries	2008[r] Quantity (thousand metric tons)	2008[r] Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Granite	7	255	$3,080	8	290	$4,270
Miscellaneous stone	20	1,730	28,300	21	1,650	30,600
Total	XX	1,990	31,400	XX	1,940	34,800

[r]Revised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3

ALASKA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009 BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Filter stone	W	W
Other coarse aggregate	9	63
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Screening, undesignated	W	W
Other fine aggregate	20	234
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Unpaved road surfacing	114	2,030
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	124	1,940
Unspecified:		
Reported	316	6,040
Estimated[2]	1,300	24,000
Total	1,940	34,800

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Estimated production without a breakdown by end use.

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TABLE 4
ALASKA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,100	$9,780	$8.89
Concrete products (blocks, bricks, pipe, decorative, etc.)	273	2,700	9.89
Asphaltic concrete aggregates and other bituminous mixtures	192	1,980	10.31
Road base and coverings	616	5,600	9.09
Fill	7	23	3.29
Snow and ice control	13	143	11.00
Filtration	10	92	9.20
Unspecified:[2]			
Reported	459	2,340	5.10
Estimated	4,660	32,900	7.06
Total or average	7,320	55,500	7.58

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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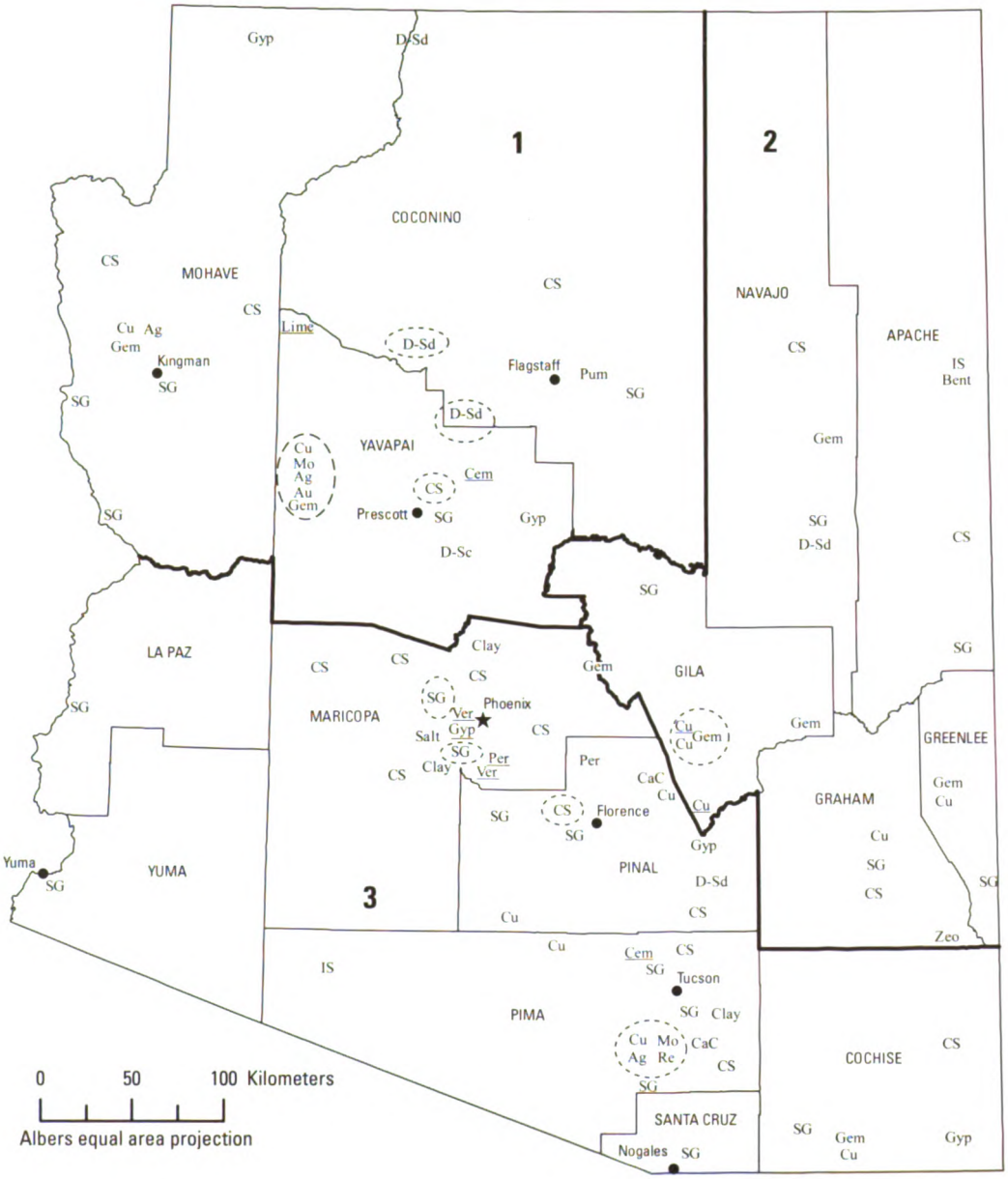
ARIZONA



Source: Arizona Department of Mines and Mineral Resources/U.S. Geological Survey (2009).

LEGEND

- County boundary
- ★ Capital
- • City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver
Au	Gold
Bent	Bentonite
CaC	Calcium carbonate
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
D-Sd	Dimension sandstone
D-Sc	Dimension schist/onyx
Gem	Gemstones
Gyp	Gypsum
Gyp	Gypsum plant
IS	Industrial sand
Lime	Lime plant
Mo	Molybdenum
Per	Perlite
Per	Perlite plant
Pum	Pumice and pumicite
Re	Rhenium (byproduct)
Salt	Salt
SG	Construction sand and gravel
Ver	Vermiculite plant
Zeo	Zeolites

Concentration of mineral operations

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THE MINERAL INDUSTRY OF ARIZONA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Arizona Geological Survey for collecting information on all nonfuel minerals.

In 2009, Arizona's nonfuel raw mineral production[1] was valued at $5.18 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $2.67 billion, or 34%, decrease from the State's total nonfuel mineral value of $7.85 billion in 2008, which had increased $572 million or 7.8%, from a total of $7.28 billion in 2007. In 2009, Arizona ranked second among the 50 States in total nonfuel mineral production value, accounting for 8.8% of the U.S. total production value of $59 billion. From 2005 through 2008, Arizona led the Nation in total nonfuel mineral production value.

Arizona continued to be the leading copper-producing State in 2009, accounting for 60% of the total U.S. copper production. Arizona has led the Nation in copper production since 1910. Copper continued to be the State's leading mineral commodity by value, comprising 73% of Arizona's total nonfuel mineral production value (table 1). Molybdenum was the second leading nonfuel mineral commodity by value, followed by construction sand and gravel, accounting for 7% of the State's total production value, and portland cement (data withheld for molybdenum and portland cement—company proprietary data). Combined, these four mineral commodities represented 96% of the State's total nonfuel mineral production value.

In 2009, only four commodities produced in Arizona increased in value (listed in descending order of increase): lime, salt, zeolites, and industrial sand and gravel (production values withheld—company proprietary data). The almost $2.7 billion decrease in Arizona's total production value was led by a significant decrease in the production value of copper, down by $2.1 billion, or 36%, from a total production value of almost $5.9 billion in 2008 to almost $3.8 billion in 2009. Other significant decreases in production value occurred with construction sand and gravel, down by $204 million, or 36%; crushed stone, down by $73 million, or 48%; and molybdenum and portland cement (production values withheld—company proprietary data). The production value of masonry cement, silver, and pumice and pumicite accounted for a combined decrease of $8.7 million, whereas the production value of dimension stone dropped $2.6 million.

In 2009, Arizona rose in rank for the quantities of gemstones, zeolites, gold, and lime produced in comparison with other producing States (in order of rank among producing States). Gemstone production rose from 2d to 1st, zeolites production rose from 5th to 4th among 6 producing States, gold production rose from 10th to 9th among 11 producing States, and lime production rose from 12th to 10th among 33 producing States. Arizona remained the same in rank in the following commodities: bentonite clay—8th of 11 producing States; construction sand and gravel and crude perlite—3d of 50 and 6 producing States, respectively; molybdenum concentrates—2d of 7 producing States; and, silver—5th of 11 producing States. The State decreased in rank in crushed stone to 30th from 28th of 50 producing States, crude gypsum to 12th from 10th of 16 producing States, dimension stone to 5th from 7th of 16 producing States, and from 1st to 6th in the production of pumice and pumicite among 7 producing States.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, bentonite	30	1,520	23	1,220	17	913
Copper[3]	731	5,290,000	836	5,880,000	711	3,780,000
Gemstones, natural	NA	1,950	NA	1,960	NA	1,540
Gypsum, crude	292	1,770	247	1,840	213	1,740
Sand and gravel, construction	86,500 r	657,000 r	67,200 r	562,000 r	40,200	357,000
Stone:						
Crushed	17,100	157,000	15,300 r	153,000 r	9,120	80,000
Dimension	W	W	123	16,400	94	13,800
Combined values of cement, clays (common), gold, lime, molybdenum concentrates, perlite (crude), pumice and pumicite, salt, sand and gravel (industrial), silver, zeolites, and value indicated by symbol W	XX	1,170,000 r	XX	1,230,000 r	XX	942,000
Total	XX	7,280,000	XX	7,850,000 r	XX	5,180,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Recoverable content of ores, etc.

TABLE 2

ARIZONA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	11	6,730	$86,400	11	3,700	$36,800
Marble	--	-- r	-- r	1	34	408
Granite	29	3,480 r	29,400 r	23	2,310	19,900
Traprock	2	205 r	2,610 r	--	--	--
Sandstone & quartzite	5 r	1,080 r	10,700 r	5	744	7,400
Volcanic cinder and scoria	6 r	259 r	2,120 r	7	99	794
Miscellaneous stone	22 r	3,590 r	21,700 r	23	2,230	14,800
Total	XX	15,300 r	153,000 r	XX	9,120	80,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	23	494
Other coarse aggregate	14	106
Coarse aggregate, graded:		
Concrete aggregate, coarse	17	207
Bituminous aggregate, coarse	W	W
Railroad ballast	W	W
Other graded coarse aggregate	210	1,620
Fine aggregate (-⅜ inch):		
Stone sand, concrete	20	744
Stone sand, bituminous mix or seal	W	W
Other fine aggregate	100	885
Coarse and fine aggregates:		
Graded road base or subbase	200	2,020
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	49	381
Other construction materials	251	2,150
Agricultural, poultry grit and mineral food	W	W
Chemical and metallurgical:		
Cement manufacture	1,580	16,300
Lime manufacture	W	W
Sulfur oxide removal	W	W
Other miscellaneous uses and specified uses not listed	1	202
Unspecified:[2]		
Reported	837	1,660
Estimated	5,570	49,500
Total	9,120	80,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
ARIZONA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W	--	--
Coarse aggregate, graded[3]	--	--	W	W	W	W	--	--
Fine aggregate (-⅜ inch)[4]	--	--	W	W	W	W	--	--
Coarse and fine aggregates[5]	W	W	101	1,110	W	W	--	--
Other construction materials	20	140	52	373	179	1,640	--	--
Agricultural[6]	--	--	--	--	W	W	--	--
Chemical and metallurgical[7]	W	W	--	--	W	W	--	--
Other miscellaneous uses	--	--	1	202	--	--	--	--
Unspecified:[8]								
Reported	3	34	34	344	1	17	797	1,260
Estimated	2,260	21,800	439	3,940	2,880	23,700	--	--
Total	3,270	33,900	802	8,410	4,250	36,500	797	1,260

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes riprap and jetty stone, and other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, terrazzo and exposed aggregate, and other coarse and fine aggregates.

[6]Includes poultry grit and mineral food.

[7]Includes cement and lime manufacture and sulfur oxide removal.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,340	$29,800	$8.92
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	611	5,580	9.13
Asphaltic concrete aggregates and other bituminous mixtures	2,420	35,000	14.45
Road base and coverings[3]	3,480	23,300	6.70
Fill	526	3,820	7.26
Snow and ice control	1	18	18.00
Golf course	48	433	9.02
Other miscellaneous uses[4]	422	4,130	9.78
Unspecified:[5]			
Reported	14,100	123,000	8.73
Estimated	15,300	132,000	8.64
Total or average	40,200	357,000	8.88

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration and railroad ballast.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6

ARIZONA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	440	4,800	211	2,330	2,690	22,700
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	W	W	W	W	520	4,460
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	1,720	25,100
Road base and coverings[3]	494	3,520	176	1,690	2,340	14,900
Fill	5	37	21	164	500	3,620
Snow and ice control	--	--	1	18	--	--
Other miscellaneous uses[4]	184	2,110	147	3,420	457	4,350
Unspecified:[5]						
Reported	2,120	18,700	289	2,630	11,500	101,000
Estimated	1,730	16,600	1,280	14,700	12,300	101,000
Total	4,970	45,800	2,120	25,000	32,000	277,000

	Unspecified district	
	Quantity	Value
Concrete aggregate (including concrete sand)	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	--	--
Asphaltic concrete aggregates and other bituminous mixtures	470	5,700
Road base and coverings[3]	470	3,190
Fill	--	--
Snow and ice control	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	148	309
Estimated	--	--
Total	1,090	9,190

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration, golf course, and railroad ballast.

[5]Reported and estimated production without a breakdown by end use.

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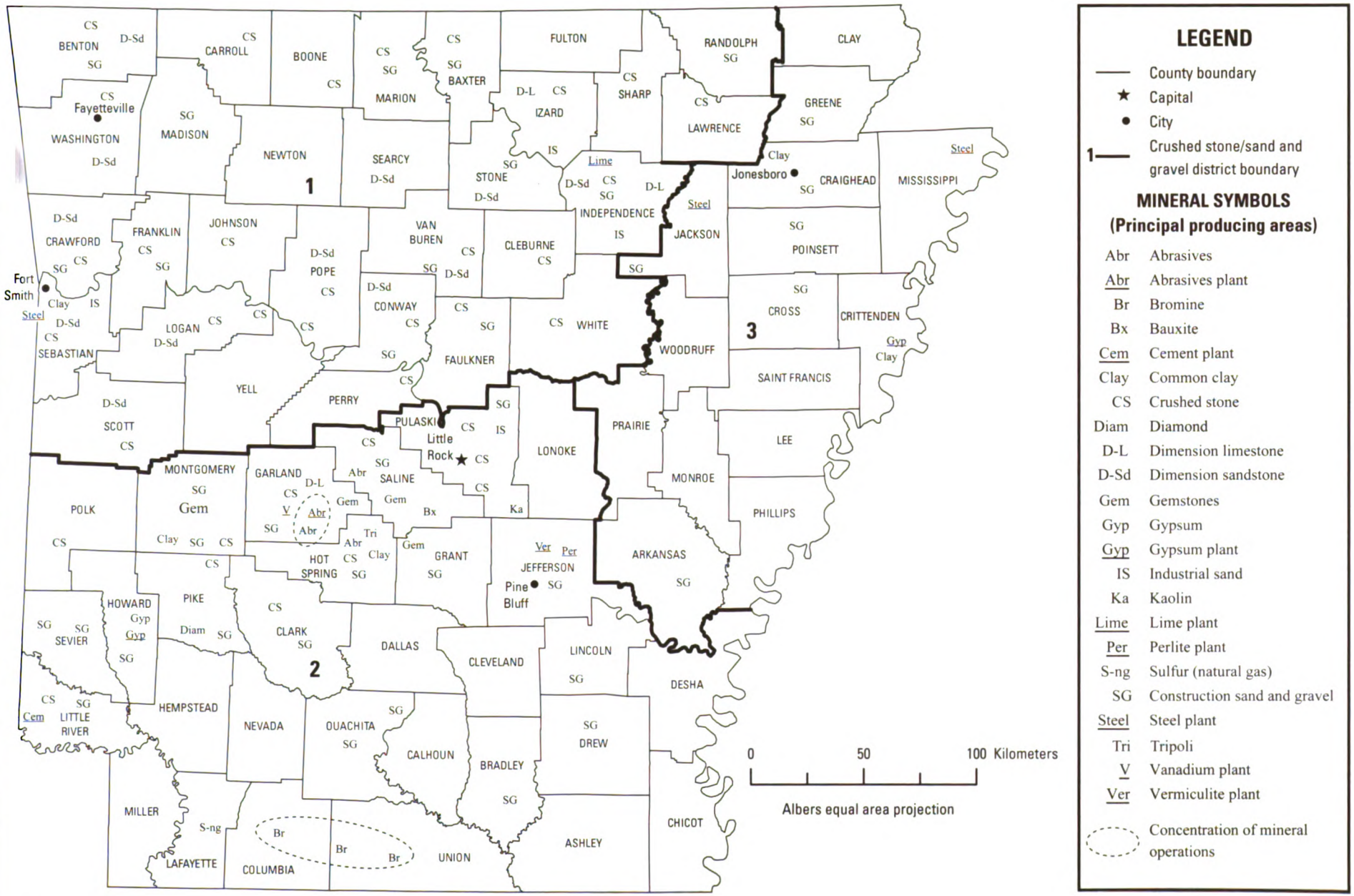
ARKANSAS



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Abr	Abrasives
Abr	Abrasives plant
Br	Bromine
Bx	Bauxite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Diam	Diamond
D-L	Dimension limestone
D-Sd	Dimension sandstone
Gem	Gemstones
Gyp	Gypsum
Gyp	Gypsum plant
IS	Industrial sand
Ka	Kaolin
Lime	Lime plant
Per	Perlite plant
S-ng	Sulfur (natural gas)
SG	Construction sand and gravel
Steel	Steel plant
Tri	Tripoli
V	Vanadium plant
Ver	Vermiculite plant

Concentration of mineral operations

Source: Arkansas Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF ARKANSAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Arkansas Geological Survey for collecting information on all nonfuel minerals.

In 2009, Arkansas nonfuel raw mineral production[1] was valued at $636 million, based upon annual U.S. Geological Survey (USGS) data. This was a $74-million, or 10%, decrease from the State's total value of $710 million in 2008, which followed a $66-million, or 8.5%, decrease from a total of $776 million in 2007. The State remained 30th in rank among the 50 States in total nonfuel mineral production value in 2009 and accounted for slightly more than 1% of the U.S. total. Per capita, the State remained 15th in rank in the Nation for its total nonfuel mineral production value; with a population of 2.89 million, the per capita production value was $220 in 2009, $26 less than the total of $246 in 2008. In 2008, Arkansas's per capita production value was 5% greater than the national average per capita production value, $234; in 2009, this increased by15%, owing to the 18% decline in the national per capita average to $192.

The leading nonfuel minerals in 2009, by descending production value, were crushed stone, bromine, portland cement, construction sand and gravel, lime, and industrial sand and gravel. These mineral commodities together accounted for nearly 97% of the State's total nonfuel mineral production value. For nearly four decades, bromine and crushed stone have been the State's two leading nonfuel minerals, by value, bromine leading in value from 1969 up to 1996 when crushed stone went from second to first. Since then, the two have exchanged rank several times; crushed stone was first in 1996–98, 2001–03, 2005, and 2008–09, with bromine ranking first in all other years. For more than a decade, cement has ranked third and construction sand and gravel has ranked fourth. Actual production values and production data for bromine and portland cement have been withheld (company proprietary data).

In 2009, the only mineral commodity to see an increase in production value was construction sand and gravel, up $4.7 million from a total of $65.1 million in 2008 to $69.8 million in 2009, with an 180,000-metric-ton (t) increase in production, up from 8.8 million metric tons (Mt) in 2008 to 8.98 Mt in 2009. Two mineral commodities produced in the State—masonry cement and tripoli—had no significant change in production or production values in 2009 (actual values withheld—company proprietary data). However, decreases (in descending order) in the values of bromine, lime, crude gypsum, and industrial sand and gravel more than offset the increase in construction sand and gravel production value in 2009 (actual values withheld—company proprietary data). The production value of crushed stone—the largest of any publishable mineral commodity for 2009—decreased by $24 million, or 10%, to $217 million in 2009 from $241 million in 2008.

In 2009, Arkansas was the Nation's only State to produce bromine; bromine production in Michigan, the only other State with recent production, ended in 2007. Arkansas continued to be the only State that produced special silica stone and it remained third in the quantities of tripoli produced among the four producing States. The State remained fourth in the quantity of kaolin clays produced and seventh in gemstones (gemstones based upon production value). Arkansas decreased in rank from sixth to eighth in common clays production and from sixth to seventh in crude gypsum.

Metals that were produced in the State—for the most part raw steel—were processed from materials acquired from other domestic and foreign sources. The principal steel mills in the State were Quanex Corp. in Sebastion County; Nucor-Yamato Steel Co. and Nucor Corp. near Hickman, Mississippi County; and Arkansas Steel Associates in Jackson County. In addition, Strategic Minerals Corp., or Stratcor, continued operation of the mill facility near Hot Springs in Garland County; the mill extracts vanadium pentoxide from recycled out-of-State vanadium-bearing feed. Bauxitic clays were mined in Saline County.

The following narrative information was provided by the Arkansas Geological Survey (AGS).

Commodity Review

Industrial Minerals

During 2009, 234 noncoal mine sites were permitted or authorized in Arkansas, down from 238 in 2008. The total area of noncoal sites under permit was over 10,000 hectares (ha), up from over 6,900 ha in 2008, and more than 7,200 ha were under bond, up from 4,600 ha in 2008. More recent information can be obtained from the Arkansas Department of Environmental Quality's Facility and Permit Summary Database, available at http://www.adeq.state.ar.us/home/pdssql/pds.asp.

Abrasives, Natural.—Seven companies continued to mine and to process novaculite to make whetstones in the Hot Springs area of Garland County, including B & C Abrasives, Inc., Blue Mountain Whetstone, Co., Dan's Whetstone Co., Eagle Mountain Whetstones Co., Halls Arkansas Oilstones, Inc., Saint Gobain Abrasives, Inc. (Norton Stones Co.), and Smiths Abrasives, Inc. In addition to construction aggregates, Martin Marietta also continued to produce novaculite from a quarry near Glen Rose in Hot Spring County. Malvern Minerals Co. continued to mine tripoli from the Bigfork Chert (Ordovician) at its mine in Saline County for processing at its plant in Hot Springs, Garland County.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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Bromine.—Albemarle Corp. (Baton Rouge, LA) continued operations at its bromine extraction and production plants near Magnolia, Columbia County.

In March 2009, Chemtura Corp. (Philadelphia, PA) filed for bankruptcy reorganization (Chemtura Corp., 2009a). During reorganization, the company announced that it would carry on business and secured $400 million of financing from Citibank, N.A. (subsidiary of Citigroup Inc.) to support its operations. The company also filed court motions to allow it to continue paying employee wages and benefits, and stated that it intended to pay supplies for all goods and services (Chemtura Corp., 2009b). The company's stock share price plunged to historic lows immediately prior to filing for reorganization. Chemtura's Union County operations and production were not dramatically affected and operations continued. Prices for bromine-based products continued to increase slowly worldwide during the year.

Cement.—Ash Grove Cement Co. in Little River County completed construction and renovation work on its $550-million plant in Foreman. The installation of the new dry kiln technology—anticipated to be completed in July 2009—at the company's flagship plant would bring total cement production capacity to near 1.5 Mt per year (Williamson, 2010). Ash Grove used chalk from the Cretaceous Annona Formation and silica from the Cretaceous Ozan Formation.

Clays.—Acme Brick Co., owned by Berkshire-Hathaway, near Malvern, Hot Spring County, continued operation of its Wilcox Group (Eocene) clay mines for brick manufacture at Perla, AR. McGeorge Construction Co. continued custom mining of bauxite on the ALCOA property in Saline County for Saint Gobain. CertainTeed Corp. mined and processed slaty shale from the Stanley Formation (Mississippian) north of Glenwood in Pike County. The company's product was a black roofing granule.

Gemstones.—There are currently 19 quartz contracts, 4 quartz leases, and 2 wavellite leases on the Ouachita National Forest under the U.S. Forest Service in Arkansas. These generated about $15,000 in revenue for the State.

At the Crater of Diamonds State Park, Pike County, 918 diamonds were recovered in 2009, down from 946 in 2008. The total weight of the stones was almost 183 carats, with an average weight of 0.20 carats. Of these diamonds, 29 weighed more than 1 carat. Diamonds recovered included 651 white, 149 brown, and 118 yellow. The largest stone recovered in 2009 was a white diamond that weighed 5.75 carats. More than 28,700 diamonds have been recovered since this property became a State park in 1972. Work began late in 2008 on the renovation of the Park Museum and continued throughout 2009. The anticipated reopening date was set between late 2010 and early 2011 (Arkansas Division of State Parks, 2013).

Gypsum.—CertainTeed Corp.'s (Valley Forge, PA) [subsidiary of Saint-Gobain Co. (Courbevoie, France)] gypsum mine and wallboard plant operation near Nashville, Howard County, continued to be a leading wallboard manufacturing plant, with a capacity of 130 million square meters per year of wallboard. The principal markets for the wallboard, sold under the trade name CertainTeed, are in the eastern United States. The plant ran a single 8-hour daily shift in response to the decline in new housing starts for most of 2009.

Lime.—Arkansas Lime Co. (part of United States Lime and Minerals, Inc.), of Batesville, Independence County, produced hydrated lime and quicklime, as well as agricultural lime and pulverized limestone for glass manufacturing. Arkansas Lime's quarry was in a section of Ordovician limestones that are of high purity and also low in silica (chert).

Nepheline Syenite.—The Big Rock Arch Street Quarry, operated by Minnesota Mining and Manufacturing Co. [a 3M company (Maplewood, MN)], continued to produce nepheline syenite to supply material for the company's roofing granule plant in Sweet Home, Pulaski County. (More information can be found in the crushed stone narrative that follows regarding an additional active producer of nepheline syenite.)

Sand and Gravel, Construction.—During the 2009 year, both gravel pit and quarry operations in the north-central part of the State increased despite the general economic slowdown in response to the needs of the petroleum drilling industry in the Fayetteville Shale gas play. More than 17,000 metric tons of aggregate (19,000 short tons), generating almost $11,000 in revenue, was produced from gravel and stone operations under lease in the Ouachita National Forest under the jurisdiction of the U.S. Forest Service.

Sand and Gravel, Industrial.—Industrial sand was produced by Unimin Corp. from its mine and processing facility at Guion, Izard County. The sand was sourced from the Ordovician St. Peter Sandstone Formation, found throughout the midwestern United States. Markets included foundry, glass, and hydraulic fracturing (frac) sand. Frac sand was comprised of washed and sized high-silica-content quartz sand with a proper grain size that was used to prop open fractures created by high-pressure fluids pumped into oil and gas wells, enlarging openings in oil- or gas-bearing rocks. Arkhola Sand and Gravel Co. of Sebastian County produced industrial sand, as well as construction sand, from its dredging operations on the Arkansas River. Both companies have local markets for their industrial sand as frac sand during the continuing development of the Fayetteville Shale gas play within the Arkansas Valley region of the State.

Delta Co., operating under the name Desoto Sand, completed its second full year of production from its sand pit east of Little Rock in Pulaski County. Arkansas Sand Co., in Independence County, was the fourth producer of frac sand in Arkansas. Several other companies were investigating potential frac sand deposits within the St. Peter Sandstone in Izard and Independence Counties. Saint-Gobain Corp. produced bauxite from Saline County, mined by McGeorge Construction Co., and shipped it to Fort Smith for the manufacture of proppants, which function similarly to natural frac sand in propping open fractures created by hydraulic fracturing.

Stone, Crushed.—During 2009, increased natural gas drilling operations in the Fayetteville Shale Play caused an increased demand for crushed stone for access roads and drilling pad construction within north-central Arkansas. Arkhola Sand and Gravel Co. produced road aggregates and asphalt mix at the Preston Quarry near Van Buren, Crawford County. Arkhola

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continued work with the Jenny Lind Quarry, Sebastian County, in the Hartshorne Formation (Pennsylvanian Period). R.D. Plant Construction Co., Inc. operated the R.D. Plant Quarry, south of Kirby in central Pike County, in the Jackfork Formation (Pennsylvanian Period).

Duffield Stone and Gravel Co. operated two sandstone aggregate quarries (Pennsylvanian Period) in Pope County—one in the Hartshorne Sandstone at Russellville, and the other, the Gumlog Quarry, in the upper Atoka Formation. Pyramid Co. produced aggregate from the middle Atoka Formation (Pennsylvanian Period) north of Greenbriar, Faulkner County.

Granite Mountain Quarries, Inc. (GMQ) produced aggregate from nepheline syenite at two quarries in Pulaski County and from the Granite Mountain No. 3 quarry near Bryant, Saline County. GMQ also operated a sandstone quarry near Y-City, Scott County, in the Atoka Formation (Pennsylvanian Period). Martin Marietta Co. actively quarried the Hatton Tuff formation of the Stanley Group (Mississippian Period) at its Hatton Quarry in southern Polk County, and continued operations at the company's Jones Mill Quarry near Magnet Cove, Hot Spring County, producing from both the hornfels and quartzite alteration zone in the Stanley Group adjacent to the Cretaceous-age igneous intrusion and the intrusive rock. Martin Marietta also operated an asphalt plant at this site.

Rogers Group, Inc. continued sandstone aggregate operations at the company's Greenbriar Quarry and its Jefferson Island Quarry, both in the middle Atoka Formation in Faulkner County, at its Conway County Quarry in upper Atoka Formation south of Solgohachia, and at its Lowell Quarry in the limestone of the Boone Formation (Mississippian Period) in southern Benton County. Schwartz Stone Co. quarried sandstone from the Hartshorne Sandstone quarry for aggregate and dimension stone north of Midway in Logan County. McGeorge Sand and Gravel Co. continued riprap barge operations along the Arkansas River from its River Mountain Quarry in the Hartshorne Sandstone area north of New Blaine in eastern Logan County. Chrisman Co. mined sandstone aggregate in the Hartshorne Sandstone area near Hunt in Johnson County and from the Savanna Formation near Ratcliffe, Franklin County.

Vulcan Materials Co. produced aggregate from its upper Morrowan age sandstone operations at Judsonia and middle Atokan age sandstones at Floyd; both sites are in White County. Vulcan also produced dolomitic limestone from lower Ordovician units near Black Rock, Lawrence County. Webco Mining Co. produced crushed stone from its quarry in the middle Atoka Formation near El Paso, White County. Quality Stone Co. produced sandstone aggregate from the Atoka Formation (Pennsylvanian Period) at its Lonestar quarry in south Cleburne County, north of the Rosebud community. Midwest Lime Co. produced aggregate from middle and upper Ordovician-age limestones near Batesville, Independence County. Limestone Specialties, Inc. produced aggregate from upper Ordovician units in Independence County.

Stone, Dimension.—Oran McBride Stone Co. of Batesville, Independence County, continued production of interior and exterior structural and architectural stone at its plant in Bethesda. Marble, limestone, and sandstone were quarried from Ordovician and Mississippian-age formations from 21 active quarries and processed as polished, cut, and rough surface product. Schwartz Stone Co. also quarried sandstone from the Hartshorne Sandstone quarry north of Midway in Logan County. Broken dimension stone (Cotter Formation) in a variety of shades was produced by Johnson Landscaping and Construction LLC from their Ozark Southern Stone Quarry, north of Eureka Springs in Carroll County. Eureka Stone Co.'s saw shop is located near this quarry, and produces a variety of sawn and turned architectural pieces. Bennett Brothers Stone Co., Inc. obtained building stone materials from deposits in Garland and Logan, and other counties, principally from Pennsylvanian-age formations.

Environmental Issues and Mine Reclamation

The Mining Division of the Arkansas Department of Environmental Quality (ADEQ) reported that there were 92 ha (228 acres) of reclaimed land released from nine permitted/authorized noncoal-producing sites during 2009.

Umetco, Inc. continued reclamation work, which began in 1997, of the LeCroy area at the Wilson Springs vanadium mines in Garland County. The Black Lick diamond property, which was reclaimed in 2004 by Star Resources Corp. of Houston, TX, is northeast of the Crater of Diamonds State Park in Pike County; during 2009, Star continued to await the release of its bond money, pending final reclamation.

Legislation and Government Programs and Activities

There was no activity, either legislatively or regulatory, during 2009 concerning noncoal mineral operations in the State of Arkansas.

The passage of the Arkansas Act 129 of 2007 officially changed the name of the Arkansas Geological Commission to the Arkansas Geological Survey (AGS) to more properly reflect the activities of the agency to the public. The AGS Web site, online for 11 years, was reorganized and is at URL http://www.geology.arkansas.gov/home/index.htm. Information posted on the Web site included State resource data; USGS annual nonfuel mineral production data; publications and map ordering information; State stratigraphic, geologic, and geohazard data; online geologic maps; agency services; and news items. The site has links to State agency services, Federal agencies, geology Web sites, organizations, and universities.

The AGS continued preparation of a spreadsheet database that contains all identified sites of mineral extraction in the State, excluding petroleum and natural gas. By the close of 2009, more than 7,500 records had been entered and field checking for 52 of 75 counties completed. Site locations were entered by latitude and longitude and by general land office survey techniques.

The AGS has been an active participant in the STATEMAP program since 1995. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which

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is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. During 2009, the Cannan, Leslie, Oxley, Pea Ridge, and Garfield 7.5-minute USGS topographic geologic maps were completed under the STATEMAP cooperative agreement. Three additional 7.5-minute geologic maps were planned to start in late 2009 with work continuing into 2010—the Alread, Botkinburg, and Old Lexington quadrangles (Arkansas Geological Survey, 2010). In September 2009, AGS received a grant for 1:24,000-scale geological mapping to map four National Park Service properties in the State: two quadrangles for both the Arkansas Post National Memorial and the Pea Ridge National Military Park and four quadrangles for both the Buffalo National River and Hot Springs National Park and its vicinity. Work began in late 2009 on these projects. Additional information about the STATEMAP geologic mapping program in Arkansas can be found on the AGS Web site.

Staff cartographers continued to digitize and to perform edge matching of the State's geology onto 1:24,000-scale USGS topographic maps. Digitized 7.5-minute geologic maps are freely available for download from the AGS Web site.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ARKANSAS[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
Clays, common		1,120	4,520	796	10,700	539	7,630
Gemstones, natural		NA	601	NA	607	NA	410
Sand and gravel, construction		9,080	66,300	8,800	65,100	8,980	69,800
Silica stone[3]	metric tons	231	1,020	W	W	W	W
Stone:							
Crushed		33,000	237,000	32,200	241,000 r	30,000	217,000
Dimension, limestone, sandstone		W	W	21	2,740	18	2,360
Combined values of bromine, cement, clays (kaolin), gypsum (crude), lime, sand and gravel (industrial), tripoli, and values indicated by symbol W		XX	467,000 r	XX	390,000 r	XX	339,000
Total		XX	776,000 r	XX	710,000 r	XX	636,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Grindstones, pulpstones, and sharpening stones; excludes mill liners and grinding pebbles.

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TABLE 2
ARKANSAS: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	43 r	11,600 r	$81,400 r	40	10,600	$68,800
Dolomite	--	--	--	2	819	6,930
Granite	4	6,370	48,600	4	6,040	46,300
Sandstone & quartzite	23	12,000	94,800 r	23	11,000	84,400
Miscellaneous stone	20 r	2,270 r	16,200 r	22	1,560	10,700
Total	XX	32,200	241,000 r	XX	30,000	217,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
ARKANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	1,140	8,270
Filter stone	108	871
Other coarse aggregate	84	789
Coarse aggregate, graded:		
Concrete aggregate, coarse	891	7,040
Bituminous aggregate, coarse	104	831
Bituminous surface-treatment aggregate	269	2,920
Railroad ballast	W	W
Other graded coarse aggregate	396	3,820
Fine aggregate (-¾ inch):		
Stone sand, bituminous mix or seal	44	437
Screening, undesignated	398	2,010
Other fine aggregate	121	1,200
Coarse and fine aggregates:		
Graded road base or subbase	3,130	20,500
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	2,130	15,300
Other construction materials	98	579
Agricultural, limestone	98	677
Chemical and metallurgical, cement manufacture	W	W
Special, asphalt fillers or extenders	W	W
Unspecified:[2]		
Reported	8,970	72,300
Estimated	10,600	76,200
Total	30,000	217,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
ARKANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	--	--	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregates[5]	4,730	32,200	W	W	W	W
Other construction materials	33	155	65	424	--	--
Agricultural[6]	98	677	--	--	--	--
Chemical and metallurgical[7]	--	--	W	W	--	--
Special[8]	W	W	--	--	--	--
Unspecified:[9]						
Reported	3,450	26,900	5,510	45,400	--	--
Estimated	6,550	47,100	4,080	29,100	--	--
Total	18,400	135,000	11,600	81,900	25	458

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes macadam, filter stone, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement manufacture.

[8]Includes asphalt fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

TABLE 5
ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	1,640	$12,900	$7.87
Asphaltic concrete aggregates and other bituminous mixtures	107	1,120	10.50
Road base and coverings	196	867	4.42
Road and other stabilization (lime)	4	32	8.00
Fill	208	1,270	6.10
Filtration	88	857	9.74
Other miscellaneous uses[2]	38	550	14.47
Unspecified:[3]			
Reported	2,090	16,600	7.93
Estimated	4,600	35,600	7.73
Total or average	8,980	69,800	7.77

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes golf course, and snow and ice control.

[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

ARKANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products	W	W	654	4,660	W	W
Asphaltic concrete aggregates and road base materials[2]	W	W	197	1,109	W	W
Fill	184	1,190	13	23	11	54
Other miscellaneous uses[3]	360	3,650	203	1,280	858	6,770
Unspecified:[4]						
Reported	704	5,400	937	7,740	452	3,460
Estimated	588	4,540	3,310	25,600	706	5,490
Total	1,840	14,800	5,120	39,300	2,030	15,800

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes road and other stabilization (lime).

[3]Includes filtration, golf course, and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

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CALIFORNIA

Source: California Geological Survey/ U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF CALIFORNIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the California Geological Survey for collecting information on all nonfuel minerals.

In 2009, California's nonfuel raw mineral production[1] was valued at $3.07 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $1.13 billion, or 27%, decrease from the State's total nonfuel mineral value in 2008, $4.2 billion, which had decreased by $215 million, or about 4.9%, from a total of $4.42 billion in 2007. In 2009, the State, after 3 consecutive years ranking third among the 50 States in total nonfuel mineral production value, decreased in rank to fifth, having been second in 2005 and first in the Nation for 6 consecutive years from 1999 through 2004. Utah remained fourth, with Florida rising from fifth in 2008 to third in 2009, primarily due to increases in the production value of phosphate rock in that State. California accounted for 5.2% of the U.S. total nonfuel mineral production value, a decrease of 0.7% from the U.S. total production value in 2008. For the 1999–2004 period, when the State ranked first in the Nation based on total production value, the State's highest percentage of the U.S. total production value was 9% in 2002.

Industrial minerals accounted for almost 95% of California's nonfuel mineral production value. In 2009, California continued as the leading construction sand-and-gravel-producing State, accounting for 9% of the commodity's total U.S. production, down from14% in 2008, and accounting for 11% of the Nation's total production value for that mineral commodity, down from 16% in 2008. Construction sand and gravel was also the State's leading mineral commodity, by production value, accounting for almost 30% of the State's total nonfuel mineral production value. Construction sand and gravel was followed by cement (portland and masonry), boron minerals, crushed stone, gold, and soda ash; these six mineral commodities accounted for almost 93% of the State's total nonfuel mineral value (table 1). The major metal produced in the State was gold, with limited production of silver (as a byproduct of gold production) and very small quantities of iron ore and tungsten.

In 2009, only two mineral commodities produced in California increased in production value by more than $1 million—gold and salt (actual values withheld—company proprietary data). Smaller increases occurred in the production value of pumice and pumicite and silver (actual values withheld—company proprietary data).

While these increases in production value were notable, all other mineral commodities produced in the State declined in production value, led by decreases in portland cement, construction sand and gravel, and crushed stone. These three mineral commodities were down $384 million, $348 million, and $194 million, respectively, and, combined, accounted for almost 82% of the total decrease in the State's total nonfuel mineral production value in 2009. Declines in the production values of boron minerals, diatomite, masonry cement, and soda ash accounted for most of the remaining percentage of the State's decrease in total production value.

Construction sand and gravel had the greatest decrease in production of any mineral commodity produced in the State in 2009, down almost 32 million metric tons (Mt) to 79 Mt in 2009 from 111 Mt produced in 2008. Crushed stone and portland cement were down a combined 12.7 Mt from 2008 to 2009.

In 2009, California continued to be the Nation's only State to produce boron compounds and remained first in the quantities of construction sand and gravel produced, first of four diatomite-producing States, and first in masonry cement production. California rose from second to first in pumice and pumicite production and from fifth to fourth in gemstone production (based upon production value). The State also continued to rank second in portland cement (behind Texas) and fire clay production, and was the second of two States that produced soda ash; third in feldspar; sixth of the 11 gold-producing States; seventh in bentonite clay production; and ninth in the production of salt. California ranked first for the total number of mineral commodities produced in any single State, with 27 raw nonfuel mineral commodities produced, followed by Nevada ranking second with 23, followed by Idaho, Texas, and Utah, each with 20, respectively.

The following narrative information was provided by the California Geological Survey[2] (CGS). The CGS production data and information, except where otherwise noted, were based upon the agency's own surveys and mine inquiries, company annual reports, and data and information derived from other State government agency sources. These data may differ from USGS annual production figures, which were based upon company responses to USGS surveys and upon USGS estimates.

Overview

California produced more than two dozen different industrial minerals during the year. In addition to those nonfuel mineral commodities ranked above, the State led the Nation in the production of natural sodium sulfate. There were about 700 active mines producing nonfuel minerals during 2009. More than 5,000 people were employed at these mines and their mineral processing plants.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]John Clinkenbeard, Supervising Engineering Geologist, and Joshua Smith, Engineering Geologist, authored the text of information submitted by the California Geological Survey.

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Industrial Minerals

The continuing downturn in the State, national, and global economies affected California's mineral industries during 2009. Particularly affected were construction materials such as construction sand and gravel, crushed stone, and portland cement. Low levels of residential and commercial construction again led to reduced demand for these mineral commodities.

Cement.—California's continuing low levels of residential and commercial construction during 2009 contributed to a further drop in both cement production and cement imports for the year, compared to previous years. Many plants continued to operate on a reduced schedule to accommodate the lower demand.

Cement imports through California ports continued to decline as demand fell. For example, the port of Stockton, San Joaquin County, experienced a 45% decrease from 0.30 Mt of imports in 2008 to 0.17 Mt of imports in 2009. Compared with the 2.2 Mt of cement imports in 2006, the decline in 2009 was about 92%.

CEMEX announced the permanent closure of its Davenport cement plant in Santa Cruz County in January 2010. The company had announced a temporary closure of the plant in March 2009 due to declining demand for cement during the recession. The plant, originally constructed in 1906 by the Standard Portland Cement Co., primarily served the San Francisco Bay region. For more than 100 years, the plant had supplied cement for projects, including the rebuilding of San Francisco after the 1906 earthquake, the Golden Gate Bridge, the California Aqueduct, the Bay Area Rapid Transit system, Pearl Harbor Naval Base in Hawaii, and the Panama Canal (Alexander, 2010).

Texas Industries Inc., of Dallas, TX, shut down the white cement kilns at its Crestmore cement plant located in Riverside County in December 2008. The plant, comprising facilities for white cement production and gray cement grinding, remained idled throughout 2009. Texas Industries also briefly idled its Oro Grande facility in San Bernardino County at the end of January 2009, in order to control inventories (Texas Industries Inc., 2010, p. 3).

Rare Earths.—The Mountain Pass rare-earth mine, San Bernardino County, was purchased from Chevron Mining Inc. (a wholly owned subsidiary of Chevron Corp.) by a group of U.S. based investors on September 30, 2008, forming Molycorp Mining LLC (formerly Molycorp Minerals LLC), a Denver-based company that owns and operates the mine. In 2009, the new company began separating rare-earth compounds from stockpiled rare-earth concentrates (Molycorp Inc., 2012).

Sand and Gravel, Construction.—In February 2009, the America Recovery and Reinvestment Act (ARRA), of which a portion focused on the development and enhancement of physical infrastructure throughout the Nation, was signed into law by the President of the United States. The Governor of California announced in September 2009 that over $2 billion in ARRA funds had been federally obligated to 620 transportation infrastructure projects statewide (California Department of Transportation, 2009a). Many of these projects were anticipated to require large amounts of construction aggregates and a full list of projects was available through the California Department of Transportation (California Department of Transportation, 2009b).

The Dutra Group's San Rafael rock quarry in Marin County gained approval of their proposed environmental impact statement from the county supervisors in October 2009. The quarry will increase its depth of mining, increase its resources, and extend the mine's life span for another 17 years (Marin County Board of Supervisors, 2009).

Vulcan Materials Company's Fish Canyon mining operation in Azusa, Los Angeles County, was in the process of revising its mining plan. The proposed revisions would shift future mining from 32 hectares (ha) of unmined land on its eastern property line to 32 ha of unmined land near its western property line. The proposed changes had been met with resistance from the neighboring community of Duarte, from which the mining along the western property line would be visible. A draft environmental impact report (DEIR) was filed in December 2009. Approval from the Azusa City Council was expected in the summer of 2010 (Tedford, 2009).

Granite Construction Co. applied for a conditional use permit in February 2008 and submitted a DEIR in September 2009, proposing the development of the 26-ha sand and gravel Kunzler Terrace Mine, 1.6 km north of Ukiah in Mendocino County, south of Mendocino Lake (Granite Construction Co., 2008). The proposed mine would produce an estimated 90,000 to 181,000 metric tons per year with total estimated production over 20 years of expected mining totaling more than 3 Mt (Granite Construction Co., 2009).

Triangle Rock Products Inc. of Los Angeles, CA (a wholly owned subsidiary of Vulcan Materials Co.), received approval from the Sacramento County Board of Supervisors in February 2009 to expand its current operation north of Florin Road, southeast of Sacramento and south of Mather Air Force Base in Sacramento County, to a 40-hectare (ha) site south of Florin Road. Under the proposed plan, the mine expansion was expected to yield about 9.7 Mt of gravel during a 12-year lifespan. The plan also called for the preservation of a 9-ha wildlife corridor along Laguna Creek west of the proposed mined area (Sacramento County Board of Supervisors, 2009).

About 13 km southeast of Orland, Glenn County, North Valley Rock LLC received a permit to mine sand and gravel at the Finch Ranch Mine. The company applied for a permit in June 2008 and expected the Mine to produce over 10 Mt of sand and gravel over an estimated 25 years of mining (North Valley Rock Products, LLC, 2008).

Stone, Crushed.—The permitting process for Granite Construction Co.'s 167-ha Liberty Quarry project continued throughout the year. The project's approval would allow Granite Construction to mine a total of more than 180 Mt of crushed rock over several decades from a granite deposit located in southeastern Riverside County about 5 km south of Temecula, on the border with San Diego County (Shyong, 2012). A DEIR for the project was released in July 2009, with public comment to continue through November 2009 (Riverside County Planning Department, 2009). In December 2008, the city of

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Temecula filed an application to annex about 2,000 ha in the vicinity of, and including, the Liberty Quarry project site, which if approved would change the permitting agency for the quarry from Riverside County to the city of Temecula. In June 2009, this application was denied by the Riverside Local Agency Formation Commission (LAFCO) (Kelly, 2009). LAFCOs are legislative regulatory agencies created in 1963 by the California Legislature, governed by the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000, with the mission to promote orderly development among competing interests (Riverside Local Agency Formation Commission, 2004).

Metals

The leading metals produced in California in 2009 were gold and silver; silver production was comparatively very small to that of gold, being produced only as a byproduct of gold production. Silver production made up less than 0.1% of California's total metal production in 2009. Iron ore, mined in relatively small quantities at one location in San Bernardino County, was used in the production of portland cement and was considered to be an industrial mineral. Tungsten concentrates were produced and shipped from the Andrew Mine in Los Angeles County (Shedd, 2011, p. 79.1).

Gold.—Gold continued to dominate California's metal production in 2009, comprising about 99% of the value of the State's metals production. According to the CGS (as derived from State government agency sources and CGS individual mine inquiries), annual production continued to increase sharply to almost 5,000 kilograms (kg) (almost 160,000 troy ounces) in 2009, an almost 39% increase as compared with the almost 3,600 kg (about 115,000 troy ounces) in 2008, which in turn was a 494% increase as compared with production of about 600 kg (less than 19,500 troy ounces) in 2007. Similarly the value of gold production in the State increased to almost $138.5 million in 2009, up from $100.6 million, or almost 38%, in 2008, which in turn was up dramatically from $13.0 million in 2007, a 674% increase.

The State's leading gold producer was New Gold Inc. (Vancouver, British Columbia, Canada), which acquired the Mesquite gold mine in Imperial County in June 2009 from Western Goldfields Inc (New Gold Inc., 2009). The mine produced approximately 4,700 kg (150,000 troy ounces) of gold by yearend (New Gold Inc., 2010a, p. 36). Prior to the acquisition by New Gold, Western Goldfields, which had acquired the mine from Newmont Mining Co. in 2003, had restarted operations in 2007, with the first gold pour in January 2008. New Gold, by yearend 2009, had announced updated proven and probable reserves totaling approximately 96,000 (kg) (3.1 million troy ounces) and an additional 150,000 kg (4.9 million troy ounces) of measured and indicated resources (inclusive of reserves), while the company anticipated total 2010 production to remain near that of 2009 (New Gold Inc., 2010b).

The other major gold producer in California was the Briggs Mine, in Inyo County, of Atna Resources, Ltd (Golden, CO). The mine was reopened after the merger of the previous owner, Canyon Resource Corp. and Atna Resources, in March 2008. The Briggs mine resumed production in May 2009 and produced approximately 340 kg (11,000 troy ounces) of gold by yearend (Atna Resources, Ltd., 2009, p. 16).

In addition to the above-mentioned lode gold mines, placer gold was produced as a byproduct mineral from numerous sand and gravel mines located in the northern and central part of the State. California also has several small underground gold mines that mainly produce specimen gold, including gold in quartz matrix for jewelry.

Legislation and Government Programs

State Mineral Land Classification Project.—The California Geological Survey's Mineral Land Classification Project, a mandate of the State's Surface Mining and Reclamation Act, continued to provide lead agencies with mineral resource maps that have been of significant value in land-use planning and mineral resource conservation (California Department of Conservation Office of Mine Reclamation, 2007, p. 49). At yearend, the CGS had completed mineral resource studies in about one-third of the State. During the year, the CGS completed an updated classification project in Kern, Riverside, and Sacramento Counties. Classification updates are ongoing in the San Luis Obispo-Santa Barbara area, the Stockton-Lodi area, the San Gabriel Valley, and the northern San Francisco Bay region. CGS also assisted the State Mining and Geology Board in the designation process for the Palm Springs Production-Consumption Region in Riverside County and the Claremont-Upland Production-Consumption Region in Los Angeles and San Bernardino Counties.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN CALIFORNIA[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	522	68,900 e	337	43,600 e	236	28,100 e
Portland	10,800	1,180,000 e	9,880	1,030,000 e	7,150	646,000 e
Clays:						
Bentonite	29	3,090	30	3,360	22	2,310
Common	549	3,390	469	3,570	318	2,370
Fire	W	W	118	W	W	W
Gemstones, natural	NA	818	NA	732	NA	727
Gypsum, crude	1,150	6,980	861	6,390	825	5,850
Sand and gravel:						
Construction	142,000 r	1,530,000 r	111,000 r	1,260,000 r	79,200	912,000
Industrial	1,850	43,400	1,500	42,300	1,300	35,800
Stone:						
Crushed	51,000	533,000	51,400 r	572,000 r	41,400	378,000
Dimension	39	12,300	26	7,320	25	6,100
Combined values of boron minerals, clays (fuller's earth, kaolin), diatomite, feldspar, gold, iron ore (usable shipped), lime, magnesium compounds, perlite (crude), pumice and pumicite, pyrophyllite (2009), salt, silver, soda ash, talc [crude (2007–08)], tungsten, zeolites, and values indicated by symbol W	XX	1,030,000 r	XX	1,240,000 r	XX	1,050,000
Total	XX	4,420,000	XX	4,200,000	XX	3,070,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
CALIFORNIA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	32 r	29,000 r	$343,000 r	25	16,400	$105,000
Dolomite	4	210	1,080	4	131	1,300
Granite	31	11,000	108,000	30	9,780	101,000
Traprock	25	4,930	51,500	20	4,540	48,900
Marble	--	--	--	4	2,490	30,700
Sandstone & quartzite	11	1,780	21,200	8	1,120	11,500
Slate	3	160	1,560	3	102	1,180
Volcanic cinder and scoria	8 r	436 r	5,450 r	11	333	4,360
Miscellaneous stone	50	3,790	39,000	46	6,460	72,900
Total	XX	51,400 r	572,000 r	XX	41,400	378,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
CALIFORNIA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	184	4,110
Filter stone	12	220
Other coarse aggregate	21	234
Coarse aggregate, graded:		
Concrete aggregate, coarse	606	10,100
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	1,080	12,900
Fine aggregate (-⅜ inch):		
Stone sand, concrete	300	3,750
Stone sand, bituminous mix or seal	344	3,310
Screening, undesignated	65	802
Other fine aggregate	722	7,040
Coarse and fine aggregates:		
Graded road base or subbase	807	8,870
Unpaved road surfacing	141	1,110
Terrazzo and exposed aggregate	33	814
Crusher run or fill or waste	489	2,460
Other coarse and fine aggregates	1,240	8,290
Other construction materials	185	2,350
Agricultural:		
Limestone	W	W
Poultry grit and mineral food	221	11,000
Other agricultural uses	95	1,400
Chemical and metallurgical:		
Cement manufacture	10,900	37,100
Glass manufacture	W	W
Sulfur oxide removal	W	W
Special:		
Asphalt fillers or extenders	W	W
Whiting or whiting substitute	W	W
Other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	282	16,400
Unspecified:[2]		
Reported	11,100	108,000
Estimated	11,900	128,000
Total	41,400	378,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

CALIFORNIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4		District 5	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1½ inch)[2]	W	W	31	529	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	92	905	W	W	W	W	W	W
Coarse and fine aggregates[5]	105	1,380	403	4,360	W	W	W	W	W	W
Other construction materials	--	--	--	--	--	--	--	--	--	--
Agricultural[6]	--	--	W	W	W	W	--	--	W	W
Chemical and metallurgical[7]	--	--	W	W	--	--	--	--	W	W
Special[8]	--	--	W	W	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	--	--	--	--	281	16,300
Unspecified:[9]										
Reported	139	339	39	444	751	8,790	1,050	12,300	275	674
Estimated	195	2,650	260	3,170	1,030	13,200	362	4,350	724	8,350
Total	560	6,720	1,110	10,600	2,340	30,800	1,980	22,200	1,550	33,300

	District 6		District 7		District 8		District 9		District 10	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:										
Coarse aggregate (+1½ inch)[2]	W	W	--	--	W	W	W	W	W	W
Coarse aggregate, graded[3]	642	9,640	W	W	W	W	W	W	--	--
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W	W	W	W	W
Coarse and fine aggregates[5]	W	W	--	--	W	W	W	W	W	W
Other construction materials	--	--	--	--	--	--	1	15	--	--
Agricultural[6]	W	W	--	--	--	--	W	W	W	W
Chemical and metallurgical[7]	--	--	W	W	W	W	W	W	W	W
Special[8]	--	--	--	--	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	--	--	1	54	--	--
Unspecified:[9]										
Reported	--	--	1,510	7,630	340	1,860	2,180	26,200	533	4,110
Estimated	403	4,720	2,450	26,900	761	4,070	3,790	37,700	527	6,170
Total	1,370	16,900	4,020	35,200	2,010	9,440	17,900	119,000	1,260	14,500

	District 11		District 12		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	--	--	--	--
Coarse aggregate, graded[3]	W	W	--	--	--	--
Fine aggregate (-⅜ inch)[4]	W	W	--	--	--	--
Coarse and fine aggregates[5]	W	W	--	--	--	--
Other construction materials	184	2,340	--	--	--	--
Agricultural[6]	--	--	--	--	--	--
Chemical and metallurgical[7]	W	W	--	--	--	--
Special[8]	--	--	--	--	--	--
Other miscellaneous uses	--	--	--	--	--	--
Unspecified:[9]						
Reported	3,780	42,000	374	3,700	87	213
Estimated	1,190	13,900	225	2,630	--	--
Total	6,590	72,200	599	6,330	87	213

See footnotes at end of table.

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TABLE 4—Continued.
CALIFORNIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.
[3]Includes bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[4]Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.
[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes limestone, poultry grit and mineral food, and other agricultural uses.
[7]Includes cement and glass manufacture, and sulfur oxide removal.
[8]Includes asphalt fillers or extenders, whiting or whiting substitute, and other fillers or extenders.
[9]Reported and estimated production without a breakdown by end use.

TABLE 5
CALIFORNIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	14,400	$169,000	$11.79
Plaster and gunite sands	2,180	27,200	12.53
Concrete products (blocks, bricks, pipe, decorative, etc.)	690	7,860	11.39
Asphaltic concrete aggregates and other bituminous mixtures	8,740	116,000	13.24
Road base and coverings	5,740	56,300	9.82
Road and other stabilization (cement)	270	2,180	8.07
Fill	2,730	24,500	8.97
Snow and ice control	18	223	12.39
Other miscellaneous uses[2]	518	5,510	10.63
Unspecified:[3]			
Reported	20,000	220,000	10.98
Estimated	24,000	284,000	11.84
Total or average	79,200	912,000	11.52

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes railroad ballast.
[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

CALIFORNIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	347	4,010	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	548	6,160	W	W
Fill	27	258	3	17	70	691
Other miscellaneous uses[4]	204	3,390	28	410	--	--
Unspecified:[5]						
Reported	101	1,150	131	1,560	111	1,260
Estimated	606	7,090	804	9,440	13	147
Total	1,110	13,800	1,860	21,600	343	3,820

	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	1,760	18,000	48	644	W	W
Asphaltic concrete aggregates and road base materials[3]	2,570	24,700	110	1,210	W	W
Fill	373	3,640	26	151	733	9,590
Other miscellaneous uses[4]	9	270	2	19	--	--
Unspecified:[5]						
Reported	7,600	80,500	412	4,550	1,470	18,600
Estimated	1,100	12,900	712	8,170	1,700	20,500
Total	13,400	140,000	1,310	14,700	4,690	60,100

	District 7		District 8		District 9	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	341	4,440	2,350	27,300	5,090	54,200
Asphaltic concrete aggregates and road base materials[3]	97	1,460	2,600	28,200	5,350	64,900
Fill	33	331	192	2,550	393	1,800
Other miscellaneous uses[4]	4	38	23	238	142	1,410
Unspecified:[5]						
Reported	116	1,320	1,910	22,000	3,100	36,600
Estimated	695	10,800	2,370	28,300	11,600	135,000
Total	1,290	18,300	9,440	109,000	25,600	294,000

	District 10		District 11		District 12	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	5,580	68,700	536	8,210
Asphaltic concrete aggregates and road base materials[3]	W	W	1,840	26,700	808	10,600
Fill	74	734	575	3,910	232	809
Other miscellaneous uses[4]	301	5,040	302	3,000	11	176
Unspecified:[5]						
Reported	989	11,600	2,180	26,500	308	4,060
Estimated	223	2,620	2,780	32,500	1,380	16,100
Total	1,990	26,000	13,300	161,000	3,280	39,900

	Unspecified districts	
	Quantity	Value
Concrete aggregate and concrete products[2]	--	--
Asphaltic concrete aggregates and road base materials[3]	--	--
Fill	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	1,580	10,100
Estimated	--	--
Total	1,580	10,100

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes railroad ballast, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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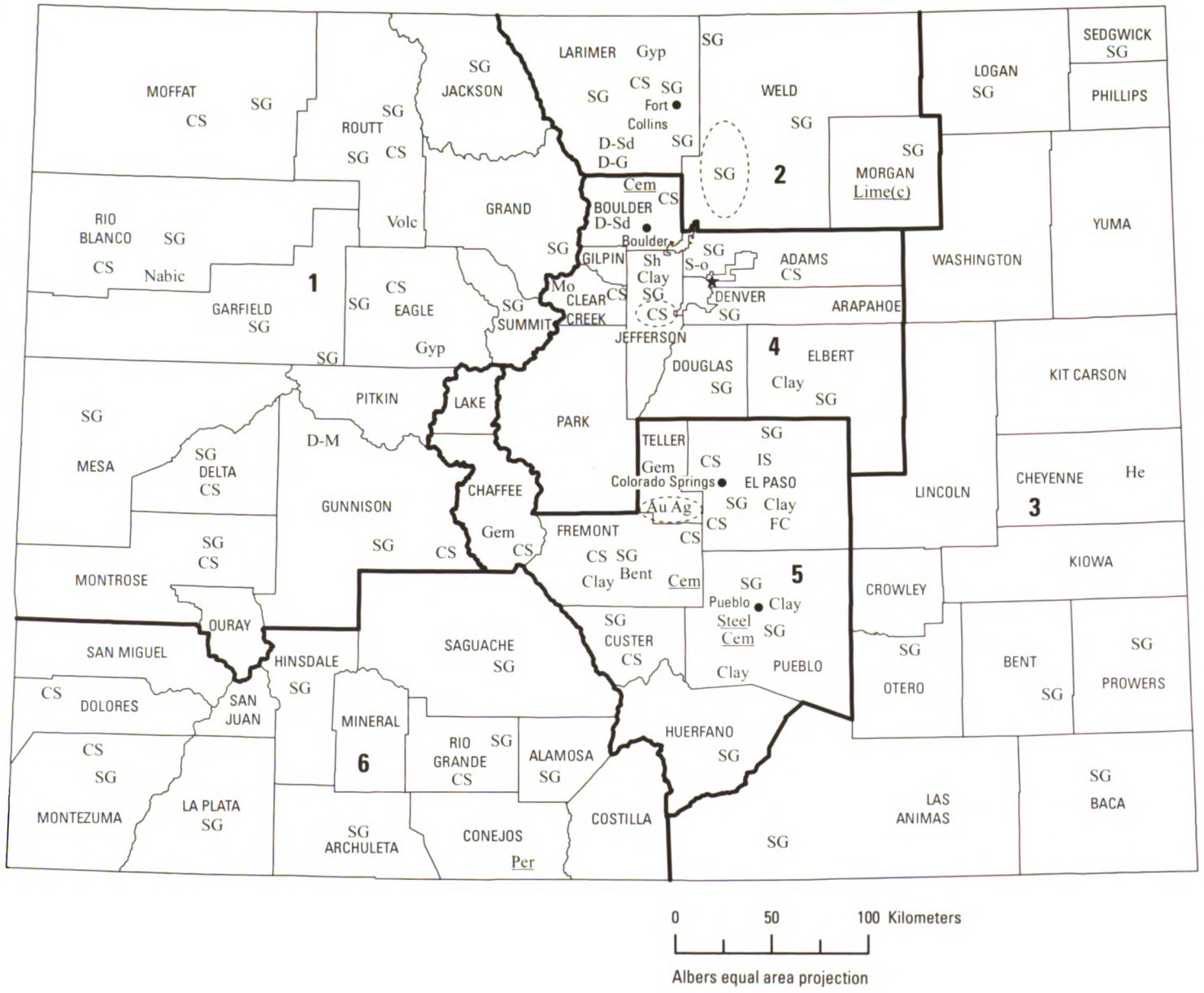

LEGEND

- County boundary
- ★ Capital
- ● City
- 1 — Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver
Au	Gold
Bent	Bentonite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-M	Dimension marble
D-Sd	Dimension sandstone
FC	Fire clay
Gem	Gemstones
Gyp	Gypsum
He	Helium
IS	Industrial sand
Lime(c)	Lime plant (captive)
Mo	Molybdenum
Nabic	Sodium bicarbonate
Per	Perlite plant
S-o	Sulfur (oil)
SG	Construction sand and gravel
Sh	Shale
Steel	Steel plant
Volc	Vocanic cinder

Concentration of mineral operations

Source: Colorado Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF COLORADO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Colorado Geological Survey for collecting information on all nonfuel minerals.

In 2009, Colorado's nonfuel raw mineral production[1] was valued at $1.42 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $640 million, or 31%, decrease from the State's total nonfuel mineral value in 2008, $2.06 billion, which remained about the same as the total value of $2.05 billion in 2007. Colorado declined in rank to 13th in 2009 from 10th in 2008 among the 50 States in total nonfuel mineral production value, while accounting for 2.4% of the U.S. total, down from 2.88% in 2008. In 2007, the State ranked 11th, and accounted for 2.93% of the U.S. total.

The State's leading nonfuel mineral commodities in 2009 were, in descending order of production value, molybdenum ores and concentrates, construction sand and gravel, gold, portland cement, and crushed stone. With the exception of gemstones and fire clays—the combined production value of which accounted for less than 1% of the State's total production value in 2009—all mineral commodities produced in State decreased in production value. Except for fire clays, gemstones, Grade-A helium, lime, and silver, all mineral commodities also decreased in the total quantity produced.

The largest decreases in production value took place in molybdenum ores and concentrates, construction sand and gravel, portland cement, and gold. These four mineral commodities accounted for 97% of the total decrease in value of $640 million. Production of molybdenum was down 30%, and the production value declined by 39%. Other significant decreases also took place in the production values of crushed stone and industrial sand and gravel (table 1).

About 67% of Colorado's nonfuel mineral production value in 2009 resulted from the production of metals—molybdenum ores and concentrates, gold, and silver—in descending order of value, a slight decrease from 70% in 2008. Prior to 2009, but increasingly since 2002, metals had accounted for a larger percentage of the total nonfuel mineral production value for the State—70% in 2008, between 60% and 67% in 2005–07, approximately 50% in 2004, and less than 30% in 2002–03. This trend was primarily the result of significantly higher increases in the average annual prices of molybdenum, with gold also contributing a significant percentage to the total percentage increase.

In 2009, Colorado continued to be first in the production of molybdenum among the 7 molybdenum-producing States and fourth in the quantity of gold produced among the 11 gold-producing States. Colorado rose to 6th from 9th, and was up from 11th in 2007, in gemstone production (gemstones based upon value). With a 22% decrease in production in 2009, the State fell to ninth from seventh in the production of construction sand and gravel. This follows an almost 20% decrease in 2008 from that of 2007, where the State decreased in rank from sixth to seventh.

Long and tubular steel products were produced at EVRAZ Group SA's (London, United Kingdom) Pueblo mill, Pueblo County, in 2009, although no iron ore was mined in the State. An expanded perlite facility operated in Antonito, Conejos County, with perlite ore obtained from New Mexico.

The following narrative information was provided by the Colorado Geological Survey[2] (CGS), and much of the data are based on its surveys, estimates, and information gathered from company annual reports.

Exploration and Development Activities

Mineral exploration and development, which had dropped off quickly in late 2008, remained at low levels in 2009. In 2009, 41 new mining permits were approved and issued in the State. Thirty-six of these permits were for sand and gravel operations or borrow pits. The remainder were for other industrial mineral commodities, including granite, gypsum, and scoria.

Metals

Gold and Silver.—Development activities continued for gold and silver at existing mines. The Bates-Hunter Mine, near Central City in Gilpin County, continued to be developed by Wits Basin Precious Minerals Inc. (Minneapolis, MN). The company possessed active mining and water discharge permits to cover an operation of almost 64,000 metric tons per year (t/yr) (70,000 short tons per year) of gold ore and waste (Wits Basin Precious Minerals Inc., 2008).

Colorado Goldfields Inc. announced the acquisition of rights to the historic Brooklyn and King Solomon Mines (Colorado Goldfields Inc., 2009a, b). In 2008, the company announced its intention to reopen several inactive gold mines in the historic Silverton area of San Juan County, planning to target the vein systems at the Gold King, the Mogul, and the Mayflower Mines. The company continued to plan the renovation of the Pride of the West mill, a 635-metric-ton-per-day (700-short-ton-per-day) mill located within 15 kilometers (9 miles) of the company's mines.

Wildcat Mining Inc., after announcing its intentions in 2008, continued to pursue the acquisition of operating permits for the Idaho and May Day Mines, and the refurbishment of the Idaho mill, in the La Plata Mountain near Durango.

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] James Burnell, Geologist and Minerals Program Director, Mineral Resources and Mapping, Colorado Geological Survey, authored the text of the State mineral industry information provided by that agency.

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At the Cresson gold mine, owned by Cripple Creek and Victor Gold Mining Co. [Victor, CO (a wholly owned subsidiary of AngloGold Ashanti, Ltd. of Johannesburg, South Africa)], resource extension drilling continued in 2009. The exploration studies were designed to quantify the potential of the high-grade mineral resource with the objective to submit a revision in 2012 to the mine extension permit. The company planned further metallurgical testing of high-grade material and further drilling.

The San Juan Silver Mining joint venture between Rio Grande Silver Inc. [Creede, CO (a wholly owned subsidiary of Hecla Mining Co. of Coeur d'Alene, ID)], Emerald Mining and Leasing LLC (Creede, CO), and Golden 8 Mining, LLC (Oklahoma City, OK), was initiated in 2008 to explore several known vein systems in the Creede District of Mineral County. The partners gained access to more than a 6,400-ha (25-square-mile) area in the district. More than 2,600,000 kg (84 million troy ounces) of silver has been produced from this area since 1891. Drilling was to focus on defining the remaining resources of the Bulldog and North Amethyst-Equity Mines (Hecla Mining Co., 2008).

LKA International, Inc. (Gig Harbor, WA) reported promising results from exploration drilling at the Golden Wonder Mine in Hinsdale County. The mine produced gold until it closed temporarily in 2006. In April, the company announced the shipment of a bulk ore sample to Teck Cominco's processing facility in Trail, British Columbia, Canada (LKA International, Inc., 2009a). In May, LKA International announced that the sample graded, on average, 132 grams per metric ton (3.85 troy ounces per short ton) gold (LKA International, Inc., 2009b). Near yearend, the company announced the continuing exploration work in areas of the mine, in anticipation of full-scale commercial production (LKA International, Inc., 2009c).

Molybdenum.—The refurbishment of the Climax Mine, owned by Freeport-McMoRan Copper & Gold Corp. (FCX) (Phoenix, AZ), was temporarily placed on hold until the price of molybdenum recovered from its sharp decrease in late 2008. The Climax Mine, located on the continental divide at Fremont Pass between Leadville and Copper Mountain, was the first major molybdenum mine in the United States. The mine had been on care-and-maintenance status since 1995. At yearend, estimates were that Climax deposit contained at least 76 million metric tons (Mt) of proven reserves of ore grading 0.19% molybdenum and more than 114 Mt probable reserves of ore grading 0.14% molybdenum (Freeport-McMoran Copper & Gold Inc., 2010, p. 32).

Energy Minerals

Uranium.—Powertech Uranium Corp. (Vancouver, British Columbia, Canada) continued to work to define their resource and the hydrogeologic systems at the Centennial Project in Weld County. The Centennial Project was designed as an in-situ recovery mine with more than 5,000 t (11 million pounds) of uranium inferred (Powertech Uranium, 2009a). In 2009, the company also announced that it entered into two options agreements for the purchase of an additional 1,450 hectares (approximately 3590 acres) of land adjacent to the Centennial Project with associated lease, mineral, and water rights (Powertech Uranium, 2009b).

Commodity Review

Industrial Minerals

Sand and Gravel, Construction, and Stone, Crushed.—Colorado produced more than 36 Mt of construction aggregate in 2009, down 23% from just over 47 Mt in 2008, with the leading aggregate producers in the State including Lafarge North America Inc. (Chicago, IL), Oldcastle Materials Inc. (Atlanta, GA), and Holcim/Aggregate Industries (Waltham, MA). The total value of Colorado aggregate was $280 million, a decrease of 24% from the 2008 value of $370 million. Sand and gravel production totaled 29 Mt, down 22% from the 2008 production total of almost 38 Mt. Average price per ton of sand and gravel in 2009 was $7.42, a decrease of almost 6% from the unit price of $7.89 in 2008. Crushed stone production decreased by 27%, from almost 9.6 Mt in 2008 to almost 7.0 Mt in 2009. Average unit value for crushed stone was $9.06 per ton, an increase of almost 22% from the unit price of $7.44 in 2008. Thirty-six new sand, gravel, and crushed stone mining permits were issued in Colorado during 2009 by the Division of Reclamation Mining and Safety, the State regulatory agency responsible for mine oversight.

Stone, Dimension.—Colorado produced about 11,000 t of dimension and decorative stone in 2009, a very significant decrease from the total of more than 27,000 t produced in 2008. Although production was down by almost 60%, the production value declined by only 31%, to $3.1 million in 2009 from $4.5 million in 2008. The most abundant stone produced was sandstone from the Lyons Formation in Boulder and Larimer Counties, east of the Front Range. Granite, marble, rhyolite, and tuff also were produced. The Yule Marble quarry in Gunnison County produced a pure, white marble that has been used in such memorials as the Tomb of the Unknowns in the Arlington National Cemetery and the Lincoln Memorial in Washington, DC.

Cement.—CEMEX USA (Houston, TX) continued to produce portland and masonry cement at its Lyons plant in Boulder County, and Holcim (US) Inc. continued to operate its plant near Florence in Fremont County. GCC Rio Grande Inc. (a subsidiary of Grupo Cementos de Chihuahua, Chihuahua, Mexico) opened a new state-of-the-art cement plant in Pueblo in 2008. The plant's design capacity was about 907,000 t (1 million short tons) of cement per year, using limestone from the Fort Hays member of the Niobrara Formation.

Common Clay and Shale.—In 2009, Colorado mines produced 61,000 t of common and bentonite clay, with a combined value of $435,000. Production of both mineral commodities, combined, was down 82,000 t, or 57%, with an almost $250,000 decrease in the production value, or 36%, from that of 2008 (table 1). Much of the clay mined in the State was common clay, used mainly to produce bricks and tiles or for use in the manufacture of cement and lightweight aggregate. In eastern Colorado, clay was mined principally from three geologic formations—the Laramie Formation (Upper Cretaceous Age), the Dakota Sandstone (Lower Cretaceous Age), and the Dawson Formation (Upper Cretaceous Age to Tertiary Age). Elsewhere in the State, clay deposits have been mined from within the Benton, Lykins, Mesaverde, Morrison,

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Niobrara, and Vermejo Formations (ranging in age from Triassic to Cretaceous). Principal producers of clay products were Robinson Brick Co. (Denver, CO), Denver Brick Co. (Denver, CO), Summit Brick Co. (Pueblo, CO), and TXI Operations (Texas Industries) (Dallas, TX).

Gypsum.—Gypsum production was down significantly because of the decline in housing starts in the region, but at least two companies continued production in 2009—American Gypsum Co. (Dallas, TX) and Colorado Lien (Laporte, CO). American Gypsum operated a wallboard plant adjacent to its mine in the town of Gypsum, Eagle County, where the commodity was excavated from evaporite deposits using a surface grinder. Colorado Lien in Laporte, Larimer County, produced gypsum from the Permian Age Lykins Formation for use within the State in the cement industry.

Sodium Bicarbonate.—Natural Soda Inc. (Rifle, CO) continued to use solution mining to recover naturally occurring sodium bicarbonate from nahcolite on leases in the Piceance Basin of Rio Blanco County in 2009. The two principal markets for Natural Soda Inc. are the food industry and the animal feed industry.

Metals

Gold and Silver.—Colorado ranked fourth in gold production among 11 gold-producing States in 2009. Total Colorado gold production for 2009 was down 15% from that of 2008 as the gold price ranged between $800 and $1,200 per troy ounce. Most of the production came from the Cresson Mine.

Additional small amounts of gold were produced from small placer mines that do not publically disclose their production figures. Silver was produced in 2009 as a byproduct of gold mining.

Molybdenum.—Colorado led in molybdenum production in 2009 with more than one-fourth of U.S. production coming from FCX's Henderson Mine near the town of Empire, Clear Creek County. This one mine produced one-half of the company's total molybdenum production for 2009, the remainder being produced as a byproduct from the company's copper production (Freeport-McMoRan Copper & Gold Inc., 2010, p. 1). The average price of molybdenum had been approximately $35 per pound in September 2008, which fell significantly during the last months of 2008 and the first four months of 2009. After price fluctuations throughout 2009, the price of molybdenum remained around $12 per pound after August (Polyak, 2011, p. 50.3). This drop caused the owners to reduce production by approximately 40% (Freeport-McMoRan Copper & Gold Inc., 2010, p. 7). Since 2005, the Henderson mine has produced more than 79 Mkg (175 million pounds) of recoverable molybdenum, with 12 Mkg (27 million pounds) being produced in 2009 (Freeport-McMoRan Copper & Gold Inc., 2010, p. 23).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN COLORADO[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Clays:						
Bentonite	W	W	2	40	1	30
Common	174	1,100	141	644	60	405
Gemstones, natural	NA	261	NA	419	NA	426
Sand and gravel, construction	47,200 r	373,000 r	37,800 r	299,000 r	29,300	217,000
Stone:						
Crushed	10,300	76,700	9,590 r	71,300 r	6,970	63,200
Dimension	21	3,870	27	4,510	11	3,110
Combined values of cement, clays [fire (2009)], gold, gypsum (crude), helium (Grade-A), lime, molybdenum concentrates, sand and gravel (industrial), silver, and value indicated by symbol W	XX	1,590,000	XX	1,680,000	XX	1,130,000
Total	XX	2,050,000 r	XX	2,060,000 r	XX	1,420,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
COLORADO: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	6	1,160 r	$10,600 r	7	507	$5,400
Marble	-- r	-- r	-- r	--	--	--
Granite	10	5,480	40,100	18	4,560	33,800
Sandstone and quartzite	10	1,570	11,300	5	1,040	8,570
Volcanic cinder and scoria	2	668	4,850	--	--	--
Miscellaneous stone	19 r	701 r	4,450 r	19	862	15,400
Total	XX	9,590 r	71,300 r	XX	6,970	63,200

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
COLORADO: CRUSHED STONE SOLD OR USED BY
PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	91	745
Filter stone	W	W
Other coarse aggregate	59	251
Coarse aggregate, graded:		
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Other graded coarse aggregate	1	13
Fine aggregate (-⅜ inch):	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Coarse and fine aggregates:		
Graded road base or subbase	660	2,560
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	47	157
Special, mine dusting or acid water treatment	W	W
Other miscellaneous uses	665	15,000
Unspecified:[2]		
Reported	2,830	23,200
Estimated	2,620	21,300
Total	6,970	63,200

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

COLORADO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 4		District 5	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[3]	W	W	--	--	W	W	W	W
Coarse aggregate, graded[4]	--	--	--	--	--	--	W	W
Fine aggregate (-⅜ inch)[5]	--	--	--	--	--	--	W	W
Coarse and fine aggregates[6]	W	W	--	--	W	W	W	W
Special[7]	--	--	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	--	--	W	W
Unspecified:[8]								
Reported	--	--	--	--	2,810	23,200	--	--
Estimated	47	964	154	1,280	1,310	10,700	1,040	7,820
Total	580	3,180	154	1,280	4,210	34,600	1,690	12,600

Use	District 6		Unspecified districts	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[3]	16	126	--	--
Coarse aggregate, graded[4]	--	--	235	10,900
Fine aggregate (-⅜ inch)[5]	--	--	--	--
Coarse and fine aggregates[6]	1	8	--	--
Special[7]	--	--	--	--
Other miscellaneous uses	--	--	--	--
Unspecified:[8]				
Reported	--	--	25	26
Estimated	61	504	--	--
Total	78	638	260	10,900

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]No production for District 3.

[3]Includes filter stone, riprap and jetty stone, and other coarse aggregate.

[4]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, and other graded coarse aggregate.

[5]Includes stone sand (bituminous mix or seal) and screening (undesignated).

[6]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

[7]Includes mine dusting or acid water treatment.

[8]Reported and estimated production without a breakdown by end use.

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TABLE 5
COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,300	$23,400	$7.09
Plaster and gunite sands	124	1,140	9.17
Concrete products (blocks, bricks, pipe, decorative, etc.)	11	199	18.09
Asphaltic concrete aggregates and other bituminous mixtures	1,400	11,500	8.20
Road base and coverings[2]	4,860	33,800	6.95
Fill	595	2,230	3.75
Snow and ice control	143	3,130	21.90
Railroad ballast	18	289	16.06
Filtration	1	8	8.00
Other miscellaneous uses	181	977	5.40
Unspecified:[3]			
Reported	5,780	49,900	8.64
Estimated	12,900	90,700	7.04
Total or average	29,300	217,000	7.42

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (cement).
[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

COLORADO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	350	3,730	790	5,120	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	844	5,800	W	W
Fill	171	640	252	950		
Other miscellaneous uses[4]	1,700	16,100	118	195	452	1,850
Unspecified:[5]						
Reported	1,410	11,600	2,170	19,500	--	--
Estimated	3,220	22,700	4,280	30,100	1,310	9,320
Total	6,850	54,800	8,450	61,700	1,760	11,200

	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	602	5,710	177	1,560
Asphaltic concrete aggregates and road base materials[3]	W	W	966	6,120	2,100	15,800
Fill	118	339	44	258	10	44
Other miscellaneous uses[4]	1,880	11,500	47	531	21	346
Unspecified:[5]						
Reported	1,720	16,000	59	132	316	2,410
Estimated	911	6,400	2,640	18,600	525	3,620
Total	4,620	34,300	4,360	31,400	3,140	23,800

	Unspecified districts	
	Quantity	Value
Concrete aggregate and concrete products[2]		
Asphaltic concrete aggregates and road base materials[3]	--	--
Fill	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	116	244
Estimated	--	--
Total	116	244

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes filtration, railroad ballast, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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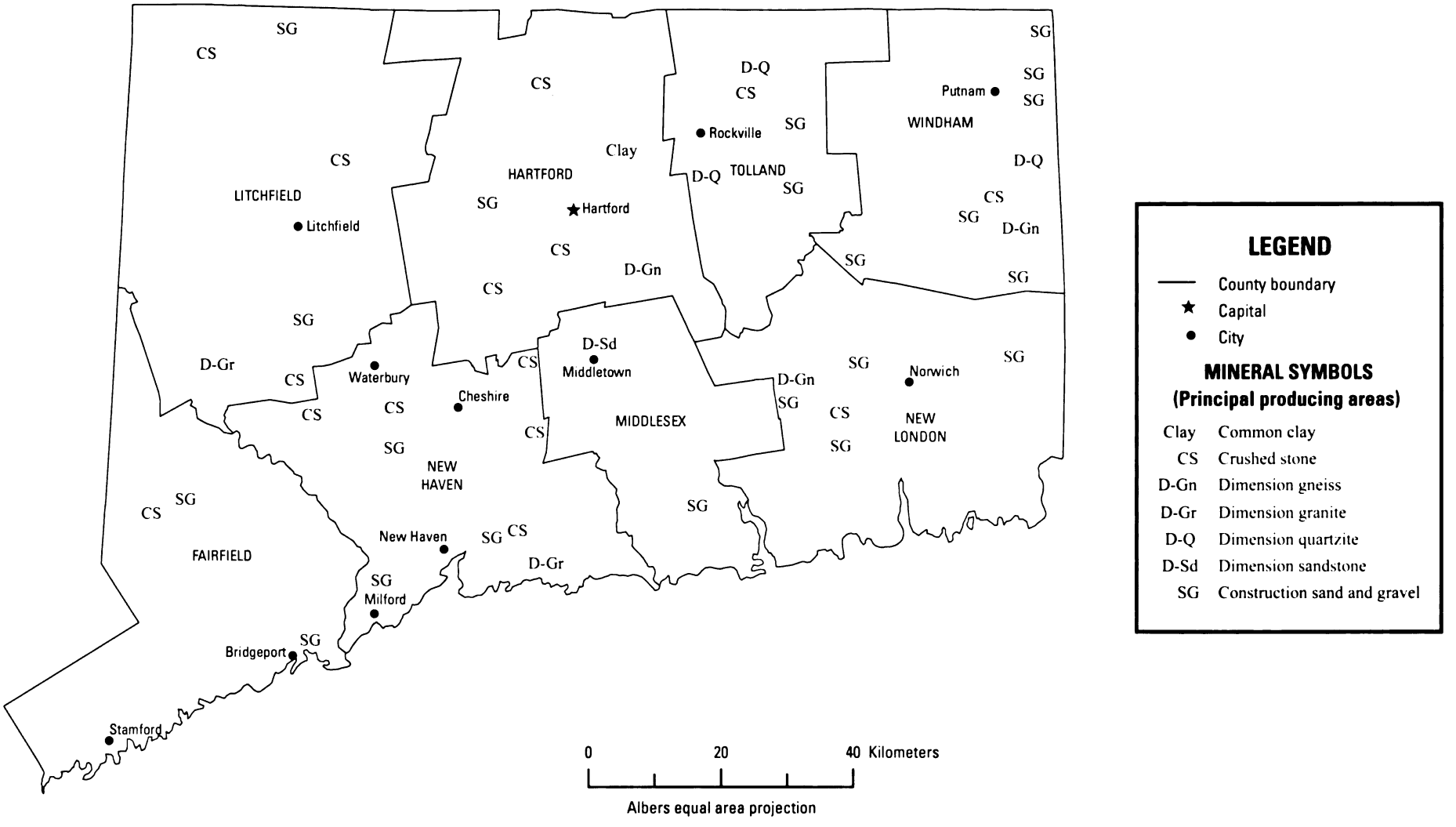
CONNECTICUT



LEGEND

- County boundary
- ★ Capital
- ● City

MINERAL SYMBOLS (Principal producing areas)

Clay	Common clay
CS	Crushed stone
D-Gn	Dimension gneiss
D-Gr	Dimension granite
D-Q	Dimension quartzite
D-Sd	Dimension sandstone
SG	Construction sand and gravel

Source: Connecticut Geological and Natural History Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF CONNECTICUT

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Connecticut Geological and Natural History Survey for collecting information on all nonfuel minerals.

In 2009, Connecticut's nonfuel raw mineral production[1] was valued at $162 million, based upon annual U.S. Geological Survey (USGS) data. This was a $13 million, or 7%, decrease from the State's total nonfuel value of 2008, $175 million, which followed a $17 million, or an almost 9%, decrease from 2007 to 2008. (Because data for common clays (2007–08) and dimension stone (2007–09) were withheld to avoid disclosing company proprietary data, the actual total production values for 2007–09 are higher than those reported in table 1.)

Crushed stone and construction sand and gravel, the leading nonfuel mineral commodities by value, accounted for 99.9% for the State's total nonfuel mineral production value. Construction sand and gravel, which accounted for almost 38% of the State's nonfuel mineral industry, had the largest decrease in total production value and decreased $8.8 million, to $60.8 million in 2009 from $69.6 million in 2008, which followed a $4.2-million decline from $73.8 million in 2007. Production of construction sand and gravel, which totaled 5.68 million metric tons (Mt) in 2009, decreased almost 1.7 Mt, or 23%, from 2008, and almost 2.7 Mt, or 32%, from 2007. The production value of crushed stone, which accounts for 62% of the State's mineral industry, decreased $5 million, or 4.7%, to $101 million in 2009 from $106 million in 2008, and 15% from $119 million in 2007. Other mineral commodities produced in the State included common clays and gemstones; their combined values accounted for less than one-quarter of 1% of the State's total production value in 2009.

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN CONNECTICUT[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	36	W	W	W	20	224
Gemstones, natural	NA	6	NA	7	NA	7
Sand and gravel, construction	8,340 r	73,800 r	7,350 r	69,600 r	5,680	60,800
Stone:						
Crushed	10,400	119,000	9,640 r	106,000 r	8,030	101,000
Dimension	W	W	W	W	W	W
Total	XX	192,000	XX	175,000 r	XX	162,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
CONNECTICUT: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008r			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	6	1,350	$24,900	6	1,160	$23,800
Granite	9	599	5,360	10	459	4,900
Traprock	11	6,290	61,800	11	5,110	56,300
Miscellaneous stone	9	1,410	13,400	11	1,310	15,500
Total	XX	9,640	106,000	XX	8,030	101,000

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
CONNECTICUT: CRUSHED STONE SOLD OR USED BY
PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	28	248
Filter stone	W	W
Other coarse aggregate	91	1,160
Coarse aggregate, graded:		
Concrete aggregate, coarse	285	3,210
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	312	4,630
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Other fine aggregate	111	1,350
Coarse and fine aggregates:		
Graded road base or subbase	339	3,030
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Roofing granules	W	W
Other coarse and fine aggregates	233	2,390
Agriculture, limestone	W	W
Unspecified:[2]		
Reported	4,650	50,900
Estimated	1,260	15,500
Total	8,030	101,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
CONNECTICUT: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	666	$7,470	$11.21
Asphaltic concrete aggregates and road base materials	280	2,810	10.04
Fill	126	799	6.34
Snow and ice control[3]	89	1,250	14.02
Unspecified:[4]			
Reported	567	5,510	9.72
Estimated	3,950	43,000	10.87
Total or average	5,680	60,800	10.71

[1]Data are rounded to no more than three significant digits, except unit values; may not add to totals shown.
[2]Includes plaster and gunite sand.
[3]Includes filtration.
[4]Reported and estimated production without a breakdown by end use.

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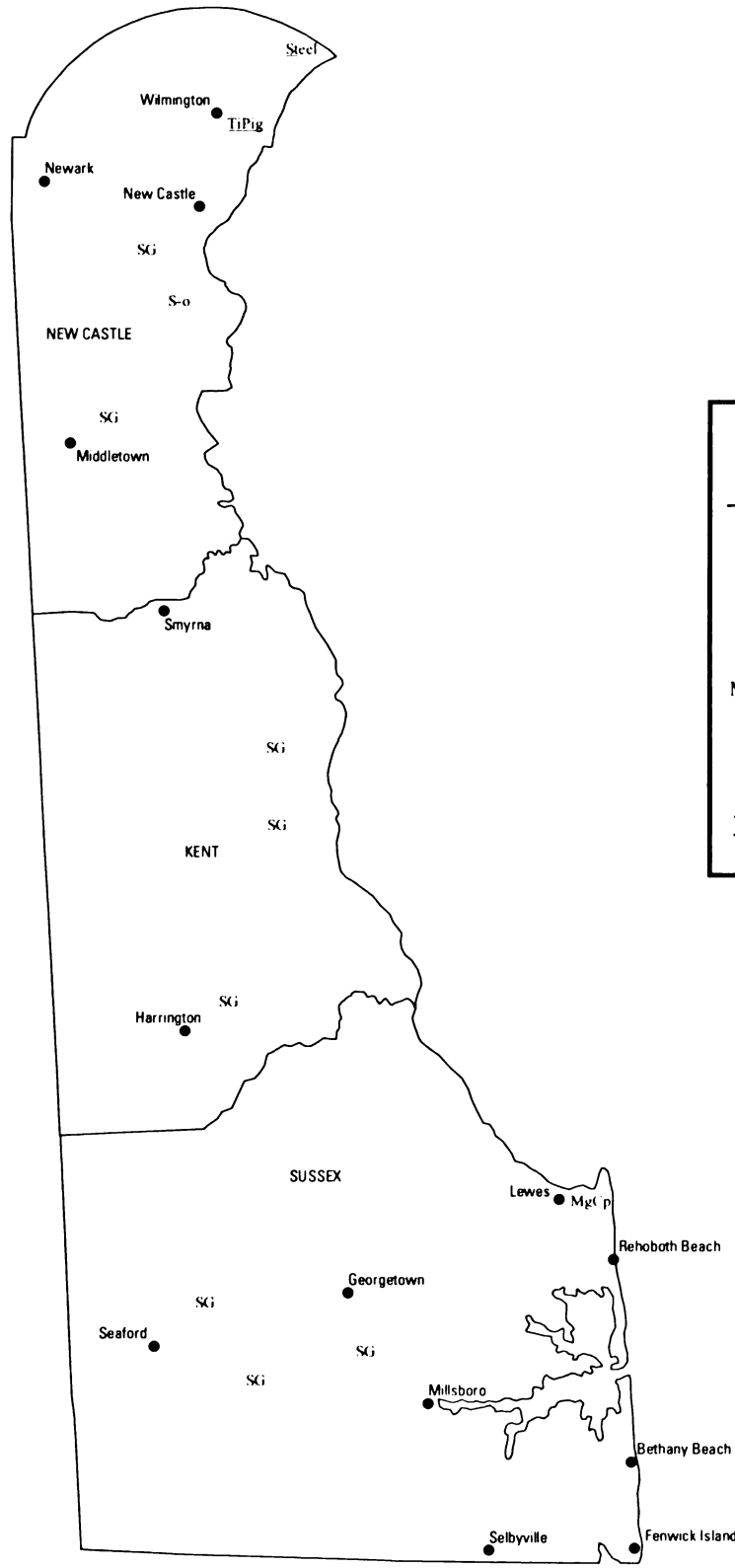
DELAWARE



LEGEND

- County boundary
- ★ Capital
- ● City

MINERAL SYMBOLS
(Principal producing areas)

MgCp	Magnesium compounds
S-o	Sulfur (oil)
SG	Construction sand and gravel
Steel	Steel plant
TiPig	Titanium dioxide pigment plant

0 10 20 Kilometers

Albers equal area projection

Source: Delaware Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF DELAWARE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Delaware Geological Survey Department for collecting information on all nonfuel minerals.

In 2009, Delaware's nonfuel raw mineral production[1] was valued at $24.5 million, based upon annual U.S. Geological Survey (USGS) data. This was a $3.9 million, or 19%, increase from the State's total nonfuel mineral value in 2008, which then had decreased by $5.8 million, or 22%, from that of 2007.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

Because production data for magnesium compounds and crushed stone were withheld (company proprietary data), the State's actual annual total values are significantly higher than those listed in table 1. The State's leading nonfuel mineral commodity in 2009 was, by value, magnesium compounds, followed by construction sand and gravel, and crushed stone. Significant increases took place in the production and value of magnesium compounds production. Construction sand and gravel production was down by 18% and its value increased by 19%. A significant decrease took place in the production and value of crushed stone. The production value of natural gemstone remained the same as that of 2008. In 2009, Delaware continued to rank fourth of five States in the quantities of magnesium compounds.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN DELAWARE[1, 2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	1	NA	1	NA	1
Magnesium compounds	W	W	W	W	W	W
Sand and gravel, construction	3,520	26,400	2,550	20,600	2,080	24,500
Stone, crushed	W	W	W	W	W	W
Total	XX	26,400	XX	20,600	XX	24,500

NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
DELAWARE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	977	$14,700	$15.00
Asphaltic concrete aggregates and other bituminous mixtures	91	1,650	18.12
Fill	253	1,210	4.79
Other miscellaneous uses	10	213	21.30
Unspecified:[2]			
Reported	--	--	--
Estimated	745	6,760	9.07
Total or average	2,080	24,500	11.82

--Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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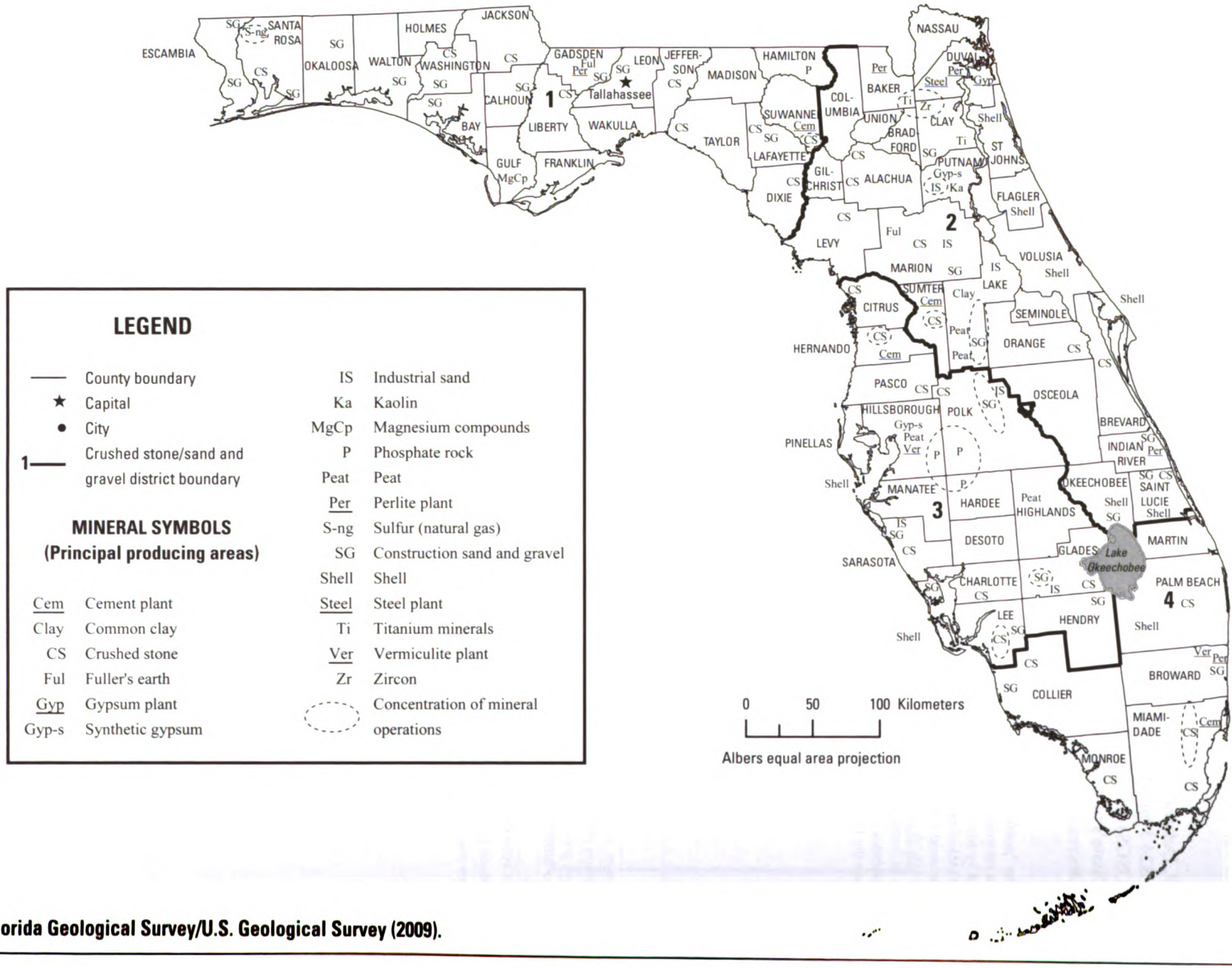
FLORIDA



LEGEND

——	County boundary
★	Capital
•	City
1——	Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Ful	Fuller's earth
Gyp	Gypsum plant
Gyp-s	Synthetic gypsum
IS	Industrial sand
Ka	Kaolin
MgCp	Magnesium compounds
P	Phosphate rock
Peat	Peat
Per	Perlite plant
S-ng	Sulfur (natural gas)
SG	Construction sand and gravel
Shell	Shell
Steel	Steel plant
Ti	Titanium minerals
Ver	Vermiculite plant
Zr	Zircon
⬭	Concentration of mineral operations

Source: Florida Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF FLORIDA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Florida Geological Survey for collecting information on all nonfuel minerals.

In 2009, Florida's nonfuel raw mineral production[1] was valued at $4.25 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $514 million, or a 14%, increase from the State's total nonfuel production value of $3.73 billion in 2008, which then had increased by almost $328 million, or almost 10%, from a total of $3.41 billion in 2007. The State rose to third in rank, up from fifth in 2008, which in turn was up from sixth in 2007, among the 50 States in total nonfuel mineral production value, of which the State accounted for 7.2% of the U.S. total in 2009, up from 5.25% in 2008. Florida last ranked third among the 50 States in total nonfuel mineral production value in 1985.

Florida continued to lead the Nation in phosphate rock mining in 2009, producing more than four times as much as the next highest producing State (actual values withheld—company proprietary data). Phosphate rock was the leading mineral commodity produced in Florida, followed by crushed stone, portland cement, construction sand and gravel, and zirconium concentrates.

In 2009, phosphate rock had the largest increase in production value and contributed significantly to the State's overall increase in total production value. Phosphate rock was followed by significant increases in the production value of magnesium compounds and lime, with smaller but still significant increases in production value taking place with industrial sand and gravel, kaolin, and peat (actual production value data withheld for magnesium compounds and lime—company proprietary data). There was no overall change in the production values of staurolite, of which Florida is the only producing State, and gemstones. The only mineral commodities to see increases in the quantities produced in 2009 were magnesium compounds, lime, and peat, up 19%, 20%, and almost 8%, respectively. The quantity of phosphate rock produced in 2009 was down 16% from that of 2008, industrial sand and gravel, almost 25%, and kaolin, 5%, respectively.

The largest decrease in production value took place with crushed stone, down approximately $250 million from a total of $894 million in 2008 to $643 million in 2009. Portland cement was down $211 million, or almost 41%, followed by construction sand and gravel, down $94.4 million, or 43%, and masonry cement, down $28 million, or 60%. Smaller decreases were seen in the production values of ilmenite (the only form of titanium concentrates produced in the State in 2009), zirconium concentrates, and fuller's earth. For these seven mineral commodities, production was down for each, led by crushed stone, which decreased by almost 20 million metric tons (Mt), or 29%, to 48.6 Mt in 2009 from 68.4 Mt in 2008. From a total production of 96.4 Mt in 2007, 2009 production was down by 50%. This was followed by construction sand and gravel, almost 13 Mt, or almost 45%, to 15.6 Mt in 2009 from 28.2 in 2008. As with crushed stone, production of construction sand and gravel was also down by almost 50% from 2007 to 2009.

In 2009, Florida continued to be the only State to produce staurolite. The State remained first in the quantity of phosphate rock produced and peat sales, second in ilmenite production, and third in the production of magnesium compounds. Florida rose in rank to first of two States producing zirconium concentrates and rose to sixth from seventh in the production of kaolin. The State fell to fifth from fourth in crushed stone production, to seventh from fourth in portland cement production, and to eighth from third in masonry cement production. In the Jacksonville area in the northeastern portion of the State, Gerdau Long Steel North America operated a steel mill with material obtained from domestic and foreign sources.

The Florida Geological Survey[2] (FGS), an office of the Florida Department of Environmental Protection (FDEP), provided the following narrative information. Production and other data in the following text are those reported by the FGS, based upon that agency's own surveys, estimates, and data from FDEP's Mining and Minerals Regulation Program. The FGS data may differ from some production figures reported to the USGS. Mine acreage values are approximations and may be subject to revision.

Exploration and Development

In 2009, the State issued 14 new permits (eight limerock, four sand, one heavy mineral, and one shell) for mining encompassing 7,350 hectares (ha). Permits were issued for the expansion or modification of 26 existing operations that encompassed almost 11,800 ha. The larger of these permits included U.S. Sugar Corp.'s Lake Harbor aggregate quarry, encompassing nearly 3,000 ha in Palm Beach County; the White Rock Quarries expansion in Miami–Dade County, encompassing 1,760 ha; the 1,400-ha expansion of the Earthsource mine, owned by Babcock Property Holdings, LLC in Charlotte County; and the 1,180-ha expansion of the Maxville satellite heavy mineral mine of Dupont Titanium Technologies (DuPont) (a subsidiary of E.I. du Pont de Nemours & Co. Inc., Wilmington, DE). Most mining operations require both State and Federal permits; legal challenges to either commonly delay the commencement of actual mining operations.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2008 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Clint Kromhout, P.G., Geologist/Environmental Specialist III, authored the text of the State mineral industry information provided by the Florida Geological Survey.

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Industrial Minerals

Cement.—High-purity limestone was used to manufacture clinker for cement. The slump in the housing market continued through 2009 and depressed cement sales, resulting in decreased production. Globally, Mexico's CEMEX Inc. (CEMEX), a major producer in the State, posted its first quarterly loss in a decade. The company's Brooksville North cement plant was indefinitely idled in 2009 (van Oss, 2011, p. 16.3).

Five companies produced clinker and finished cement from six plants Statewide in 2009: CEMEX operated its Brooksville South and Miami plants; Tarmac America LLC operated its Pennsuco plant in Miami; Vulcan Materials' Florida Rock at its Newberry plant; and, Suwannee American Cement, LLC at its Bradford plant. American Cement Co., LLC had finished construction of its new cement plant at Sumterville in Sumter County at the end of 2008. The company commenced production of clinker and finished cement at the new 1-million-metric-ton-per-year plant in 2009 (van Oss, 2011, p. 16.3). In addition, Vulcan Materials' Florida Rock Industries Division idled its Port Manatee grinding plant during the year, performing cement regrinding operations at its Tampa facility.

Clays.—Fuller's earth clays and kaolin were mined in several locations within the State. The State's fuller's earth clays were mainly of two different types, attapulgite and montmorillonite. The primary Florida fuller's earth deposits are part of the Meigs-Attapulgus-Quincy District, extending from the eastern Florida panhandle northward into Georgia. In 2009, Florida continued to rank first in the Nation in the production of attapulgite and sixth for the combined production of attapulgite and montmorillonite. The gellant grades of attapulgite were particularly useful as thickeners in such items as drill muds and paints, although they also were used in fertilizer carriers, desiccants, oil and grease absorbents, other filler and extender applications, and various other products. Two companies in the Florida panhandle mined or sold gellant-grade attapulgite in 2009 (Virta, 2011, p. 18.4). The two dominant markets for the montmorillonite variety of fuller's earth were pet litter and oil and grease absorbents, while other major markets included civil engineering applications and pesticide carriers. The State's kaolin was used in ceramics manufacturing, as well as in the production of pigments and paper, and in refractories.

Phosphate Rock.—Phosphate rock mining was conducted by three companies—Mosaic Co. of Plymouth, MN (five mines), CF Industries, Inc. of Deerfield, IL (one mine), and PCS Phosphate Co., Inc. of Northbrook, IL (one mine) in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. These seven mines represented 65% of the domestic annual production capacity (Jasinski, 2011, p. 56.1). Three new mines were planned for the next decade to replace existing operations and were in the permitting process. Phosphate rock production and domestic consumption were at their lowest points in four decades in 2009, owing to the global economic crisis (Jasinski, 2011, p. 56.1). Phosphate rock was used primarily for producing phosphoric acid used in the manufacture of fertilizer; other uses included as an additive to animal feed. Mosaic Co. shipped beneficiated ore by barge from the Port of Tampa to processing facilities in Louisiana; PCS Phosphate Co. shipped fertilizer products from its Swift Creek Mine in Hamilton County, in northern Florida, to consumer by rail and to Morehead City, NC, for export (Jasinski, 2011, p. 56.2).

FDEP records indicated that, since July 1975, 71% of land mined for phosphate has been reclaimed, as according to Florida Administrative Code 62C–16. Florida has required that all mined lands be reclaimed, as administered by FDEP's Bureau of Mine Reclamation. In 2009, more than 1,000 ha (more than 2,500 acres) of land were mined for phosphate (Florida Department of Environmental Protection, 2010, p. 2). Land mined for phosphate ore, since July 1975, totaled more than 75,000 ha, with slightly less than 54,000 ha having been reclaimed by the end of 2009 (Florida Department of Environmental Protection, 2010, p. 6).

Metals

Titanium and Zirconium.—In 2009, production of ilmenite, rutile, and zirconium concentrates continued at heavy-mineral sand mines in Baker, Bradford, Clay, and Duval Counties, in the northeastern part of the State near Jacksonville. Since 1949, DuPont has mined the Trail Ridge sands east of Starke (DuPont Titanium Technologies, 2012). The company typically produced a mixed product containing ilmenite, leucoxene, and rutile—the primary minerals used as feedstock in DuPont's titanium oxide pigments (Gambogi, 2011a, p. 78.2). Iluka Resources Inc. [a subsidiary of Iluka Resources Ltd. (Perth, Australia)] completed and ended reprocessing stockpiled zirconium tailings near Green Cove Springs (Iluka Resources, Ltd., 2009, p. 44). DuPont produced zirconium as a coproduct of the processing of heavy-mineral sands from its mines near Starke. Zirconium mineral concentrates are primarily used in ceramics opacification, foundry sands, and refractories (Gambogi, 2011b, p. 85.1–85.2).

Environmental Issues, Mining Moratoriums, and Reclamation

In recent years, environmental concerns such as potential contamination of freshwater aquifers, damage to ecosystems from blasting, dust, and truck traffic issues have been at the forefront during the mine permitting process in Florida. In some areas, housing developments, ecologically vulnerable zones, or community water wells were adjacent to minable lands. Local, State, and Federal governing and regulatory bodies typically attempt to balance environmental protection with economic needs when approving and permitting mining operations, though often many permit decisions end up in court.

The South Florida Water Management District (SFWMD) and U.S. Sugar Corp. entered into an agreement allowing the SFWMD to purchase 76,000 ha of sugarcane croplands south of the lake for $1.7 billion, as part of an effort to restore the Florida Everglades by reestablishing surface water southward out of Lake Okeechobee (Cave, 2008). The proposal was held up by a law suit filed by Florida Rock Industries, claiming that Florida Rock Industries held a mining lease with U.S. Sugar covering

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approximately 3,000 ha of the parcel being sold. U.S. Sugar maintained that Florida Rock broke the terms of the lease contract when it failed to acquire all of the necessary permits for mining (South Florida Business Journal, 2009). Economic, social, and legal pressure reduced the proposed purchase to 29,000 ha for a total purchasing price of $533 million (South Florida Water Management District, 2009). The proposed purchase was eventually tabled during the Florida legislative session and was unresolved at yearend.

Following a 1-year moratorium in 2008 on mining in its southeastern region, Lee County Commission analyzed amendments updating the County Plan from May 2009 through yearend for the 34,000-ha Density Reduction-Groundwater Resource (DR/GR) area in the eastern half of the county to protect groundwater resources. The DR/GR was created in 1990 to protect the county's shallow aquifers and comply with State mandates that population capacity be reduced within the area (Dover, Kohl, and Partners, 2009).

Mosaic Co. received a permit in March 2009 from FDEP to expand its South Fort Meade phosphate mine from Polk County into Hardee County by approximately 3,100 ha (Mosaic Co., 2009, p. 32). Lee and Sarasota Counties had challenged this permit in court, with a State administrative law judge finding in the company's favor in December 2008. The Lee County Board of County Commissioners had voted to appeal the ruling to the Second District Court of Appeal. The company had yet to obtain a necessary wetlands permit from the U.S. Army Corp of Engineers (USACE) (Mosaic Co., 2009, p. 89). Mosaic Co. owned the aboveground assets of the South Fort Meade Mine, including the beneficiation plant and rail track. The U.S. government owned mineral rights beneath approximately 223 ha, with the company controlling the rights to mine the reserves (Mosaic Co., 2009, p. 9). The South Fort Meade Mine has an annual capacity of 6 Mt, with production in 2009 totaling 5.1 Mt (Mosaic Co., 2009, p. 7). The company reported reserves totaling 54 Mt (Mosaic Co., 2009, p. 8).

Twelve Lake Belt area mines in and around Miami-Dade County temporarily closed in 2006 in response to a 2005 lawsuit challenging the permits issued to the mines (South Florida Business Journal, 2010). Following the closure, the Florida Department of Transportation released a strategic aggregates study and, in 2007, the Florida legislature created a "Strategic Aggregates Review Task Force" (Strategic Aggregates Review Task Force, 2008.) The plaintiffs in the original lawsuit argued that the environmental impact statement (EIS) prepared by USACE and the U.S. Department of the Interior's Fish and Wildlife Service did not adequately assess the danger posed to Miami-Dade's drinking water supply and could contribute to destroying Everglades' wetland habitats, owing to benzene having been identified in one of the Miami-Dade's well field wells (South Florida Business Journal, 2010). A U.S. District Judge sided with the plaintiffs in 2007 and required USACE to draft a supplemental EIS for the mining permit areas before the temporary closures could be lifted. The Task Force presented its final report to the Governor in February 2008.

In May 2008, the 11th District Court of Appeals overturned an injunction that had halted mining in the Lake Belt area of Miami-Dade County, forcing a reexamination of the case (Southwest Florida Regional Planning Council, 2008). In January 2009, the U.S. District Court of South Florida once again suspended all nine new mining permits in the Lake Belt area (U.S. District Court of South Florida, 2009). The permits would have allowed expansion of existing aggregate mining by Titan America, Vulcan Materials' Florida Rock Industries Division, Kendall Properties and Investments, CEMEX' Rinker Materials of Florida, Saw Grass Rock Quarry Inc., Tarmac America LLC, White Rock Quarries, and the Opa-Locka West Airport. The ruling did not affect ongoing operations, but does affect plans to mine over 8,000 ha (more than 20,000 acres) adjacent to the Everglades and the Northwest groundwater well field. A local mining association filed a challenge to this latest ruling with the U.S. District Court of Appeals.

Governmental Programs

The FGS has been an active participant in the STATEMAP Program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP) through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers.

The FGS completed geologic mapping for the western portion of the USGS 1:100,000-scale Ocala quadrangle. The products included a geologic map, cross sections, and a physiographic regions map. Several cores were drilled and numerous hand samples were taken and archived in the FGS State Geologic Sample Repository for future reference. The maps and cross sections are available as part of the FGS Open-File Map Series (Green and others, 2009a) and FGS Open-File Report (Green and others, 2009b).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN FLORIDA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	524	86,100 e	310	47,000 e	123	18,700 e
Portland	5,510	557,000 e	4,980	518,000 e	3,150	307,000 e
Clays:						
Common	3	W	2	W	W	W
Kaolin	21	2,770	19	2,520	18	3,000
Gemstones, natural	NA	1	NA	1	NA	1
Peat	501	9,800	488	9,760	527	10,100
Sand and gravel:						
Construction	30,400 r	232,000 r	28,200 r	219,000	15,600	125,000
Industrial	441	8,110	573	7,480	431	8,270
Stone, crushed	96,400	1,150,000	68,400 r	894,000 r	48,600	643,000
Combined values of clays (fuller's earth), lime, magnesium compounds, phosphate rock, staurolite, titanium concentrates, zirconium concentrates, and values indicated by symbol W	XX	1,360,000	XX	2,040,000	XX	3,130,000
Total	XX	3,410,000	XX	3,730,000	XX	4,250,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
FLORIDA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

	2008			2009		
Type	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	88 r	65,900 r	$867,000 r	86	46,300	$620,000
Dolomite	4	923	8,510	3	171	1,370
Shell	3	475	3,710	5	414	5,310
Miscellaneous stone	3	1,120	14,300	3	1,670	16,000
Total	XX	68,400 r	894,000 r	XX	48,600	643,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	46	785
Filter stone	W	W
Other coarse aggregate	151	3,270
Coarse aggregate, graded:		
Concrete aggregate, coarse	317	5,650
Bituminous aggregate, coarse	W	W
Railroad ballast	W	W
Other graded coarse aggregate	4,430	109,000
Fine aggregate (-⅜ inch):		
Stone sand, concrete	424	5,520
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	383	2,900
Other fine aggregate	3,630	68,100
Coarse and fine aggregates:		
Graded road base or subbase	3,400	24,300
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	719	4,500
Other coarse and fine aggregates	2,620	33,200
Other construction materials	725	4,800
Agricultural:		
Limestone	W	W
Other agricultural uses	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Sulfur oxide removal	W	W
Unspecified:[2]		
Reported	12,400	186,000
Estimated	18,100	181,000
Total	48,600	643,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	1,420	21,700	W	W
Coarse and fine aggregates[5]	589	8,080	3,100	21,900	1,460	13,100	W	W
Other construction materials	--	--	--	--	725	4,800	--	--
Agricultural[6]	W	W	--	--	W	W	--	--
Chemical and metallurgical[7]	--	--	W	W	--	--	--	--
Unspecified:[8]								
Reported	1,800	26,800	1,780	26,600	2,620	38,900	6,170	93,400
Estimated	2,080	19,100	3,290	41,400	5,610	48,800	7,170	71,900
Total	5,500	77,700	9,220	111,000	13,400	160,000	20,500	294,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone and other agricultural uses.

[7]Includes cement manufacture and sulfur oxide removal.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	3,290	$30,300	$9.24
Asphaltic concrete aggregates and road base materials[3]	451	3,540	7.84
Fill	1,150	2,850	2.48
Other miscellaneous uses[4]	328	3,150	9.59
Unspecified:[5]			
Reported	4,380	35,300	8.06
Estimated	6,000	49,700	8.28
Total or average	15,600	125,000	8.01

[1]Data are rounded to no more than three significant digits, except unit values; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes golf course.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6

FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2	
Use	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	690	5,890	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	W	W
Fill	W	W	W	W
Other miscellaneous uses[4]	222	986	2,320	19,500
Unspecified:[5]				
Reported	337	2,970	636	5,080
Estimated	1,200	9,820	1,590	13,700
Total or average	2,450	19,700	4,540	38,300

	District 3		District 4	
Use	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	W	W
Fill	W	W	W	W
Other miscellaneous uses[4]	1,020	8,920	964	4,600
Unspecified:[5]				
Reported	3,410	27,200	--	--
Estimated	3,030	24,600	187	1,620
Total or average	7,460	60,700	1,150	6,220

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes golf course.

[5]Reported and estimated production without a breakdown by end use.

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GEORGIA

LEGEND

- County boundary
- ★ Capital
- • City
- 1— Crushed stone/sand gravel district

MINERAL SYMBOLS (Principal producing areas)

Ba	Barite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
D-M	Dimension marble
Fel	Feldspar
FePig	Iron oxide pigments
Ful	Fuller's earth
Gyp-s	Synthetic gypsum
IS	Industrial sand
Ka	Kaolin
Mica	Mica
Mul	Synthetic mullite plant
Per	Perlite plant
SG	Construction sand and gravel
Steel	Steel plant
TiPig	Titanium dioxide pigment plant
	Concentration of mineral operations

Source: Georgia Department of Natural Resources, Environmental Protection Division/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF GEORGIA

In 2009, Georgia's nonfuel raw mineral production[1] was valued at $1.4 billion, based upon annual U.S. Geological Survey data (USGS). This was a $378 million, or a 21%, decrease from the State's total of about $1.8 billion in 2008, which then had decreased by $274 million, or 13% from that of 2007. The State remained 14th in rank among the 50 States in total nonfuel raw mineral production value and accounted for 2.4% of the U.S. total. Yet, per capita, the State ranked 22d in the Nation in its mineral industry's nonfuel mineral production; with a population of about 9.8 million, the value of production was about $144 per capita.

Georgia continued to be the leading clay-producing State in the United States in 2009, accounting for 23% of the Nation's total clay (all kinds) production. Kaolin clay, by value, remained Georgia's leading nonfuel mineral commodity, followed by crushed stone. The combined value of these two leading mineral commodities accounted for 86% of the State's total nonfuel mineral production value. Georgia's decrease in total nonfuel mineral production value was the result of decreases in the majority of the State's mineral commodity values, the largest decrease being that of kaolin clay, down by $179 million followed by crushed stone, down by $148 million. Moderate decreases in production value took place for cement (masonry and portland, withheld—company proprietary data) and construction sand and gravel, down by $9.2 million. Decreases in the production value took place for common clays, down by $2.1 million; industrial sand and gravel, down by $1.4 million; and dimension stone, down by $1.2 million. Decreases in the production value also took place for crude mica and fuller's earth clay. Smaller, yet significant, decrease in the production value also took place for iron oxide pigments. A moderate increase in the production value of lime coincided with a moderate increase in lime production. A smaller, yet significant, increase in the production value also took place for feldspar, despite a decrease in the quantity produced. The production value of barite and natural gemstone remained the same as that of 2008.

In 2009, Georgia continued to lead the Nation in the quantities of kaolin and iron oxide pigments produced (descending order of value). It remained second of two barite-producing States, third in crude mica, fourth in dimension stone, fifth in common clays, and sixth in crushed stone. The State rose to seventh from eighth in masonry cement and decreased to sixth from fifth in feldspar. Additionally, Georgia was a significant producer of industrial sand and gravel, accounting for 3.2% of the total U.S. production of the commodity.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN GEORGIA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Barite	W	W	7	1,350	7	1,350
Clays:						
Common	1,350	8,110	952	6,020	631	3,870
Fuller's earth	758	67,700	646 r,3	51,800 r,3	W	W
Kaolin	6,570	924,000	6,290	872,000	4,970	693,000
Gemstones, natural	NA	9	NA	74	NA	74
Sand and gravel:						
Construction	10,200	63,800	7,360 r	40,300 r	5,260	31,100
Industrial	1,040	18,100	841	20,700	775	19,300
Stone:						
Crushed	80,100	815,000	61,900	666,000	45,100	518,000
Dimension	162	18,900	169	18,200	153	16,900
Combined values of cement, clays [fuller's earth (2008)], feldspar, iron oxide pigments (crude), lime, mica (crude), and values indicated by symbol W	XX	148,000	XX	114,000	XX	128,000
Total	XX	2,060,000	XX	1,790,000 r	XX	1,410,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Excludes attapulgite; included in "Combined values."

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TABLE 2
GEORGIA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

(Thousand metric tons and thousand dollars)

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	17 r	6,980 r	$77,800 r	14	5,100	59,700
Marble	3	1,160	32,200	3	1,050	31,800
Granite	62 r	53,200 r	549,000	63	38,100	417,000
Sandstone & quartzite	-- r	-- r	-- r	--	--	--
Slate	-- r	-- r	-- r	--	--	--
Miscellaneous stone	3	583	6,620	3	855	9,060
Total	XX	61,900	666,000	XX	45,100	518,000

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
GEORGIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	85	709
Filter stone	W	W
Other coarse aggregate	812	10,400
Coarse aggregate, graded:		
Concrete aggregate, coarse	894	5,140
Bituminous aggregate, coarse	W	W
Railroad ballast	W	W
Other graded coarse aggregate	8,040	103,000
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	934	8,650
Other fine aggregate	7,160	86,200
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	9,970	101,000
Agricultural, limestone	W	W
Chemical and metallurgical, lime manufacture	W	W
Special:		
Mine dusting or acid water treatment	W	W
Asphalt fillers or extenders	W	W
Other fillers or extenders	848	27,400
Unspecified:[2]		
Reported	8,320	94,500
Estimated	3,950	45,600
Total	45,100	518,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
GEORGIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	439	4,360	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregates[5]	W	W	W	W	W	W
Agricultural[6]	W	W	--	--	--	--
Chemical and metallurgical[7]	--	--	--	--	W	W
Special[8]	W	W	--	--	W	W
Unspecified:[9]						
Reported	3,110	34,600	3,700	42,200	1,510	17,700
Estimated	1,160	19,100	--	--	2,790	26,500
Total	11,300	152,000	15,300	173,000	18,400	192,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.
[3]Includes bituminous aggregate (coarse), concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregate.
[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes limestone.
[7]Includes lime manufacture.
[8]Includes asphalt fillers or extenders, mine dusting or acid water treatment, and other fillers or extenders.
[9]Reported and estimated production without a breakdown by end use.

TABLE 5
GEORGIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,676	$15,524	$5.80
Plaster and gunite sands	219	1,183	5.40
Concrete products (blocks, bricks, pipe, decorative, etc.)	W	W	5.93
Road base and coverings	W	W	4.22
Fill	27	94	3.48
Other miscellaneous uses[2]	77	407	5.29
Unspecified:[3]			
Reported	1,377	8,459	6.14
Estimated	885	5,394	6.09
Total or average	5,261	31,061	5.90

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filtration.
[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

GEORGIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified district	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	W	W	[3]	[3]	W	W	--	--
Road base and coverings	W	W	--	--	--	--	--	--
Fill	W	W	--	--	W	W	--	--
Other miscellaneous uses[4]	113	686	--	--	2,850	16,200	--	--
Unspecified:[5]								
Reported	810	4,690	--	--	525	3,470	42	299
Estimated	144	889	[3]	[3]	494	2,980	--	--
Total	1,070	6,260	283	1,860	3,870	22,600	42	299

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Withheld to avoid disclosing company proprietary data; included in "Total."

[4]Includes filtration.

[5]Reported and estimated production without a breakdown by end use.

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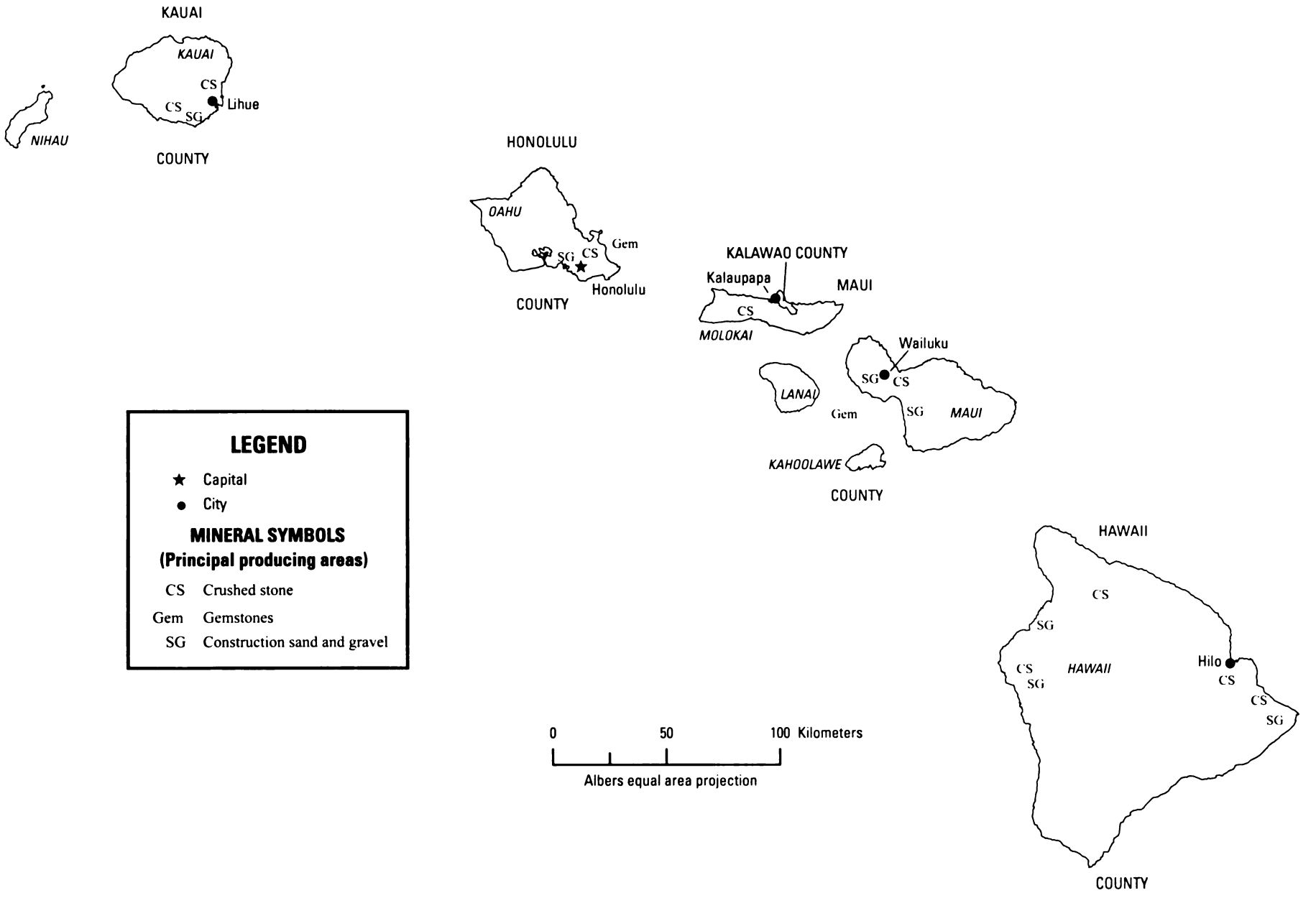
HAWAII



Source: Hawaii Department of Land and Natural Resources/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF HAWAII

In 2009, Hawaii's nonfuel raw mineral production[1] was valued at $116 million, based upon annual U.S. Geological Survey (USGS) data. This was a $48-million, or 29%, decrease from that of 2008, which followed a $1.2 million, or about 1%, decrease from 2007 to 2008. Hawaii ranked 46th (42d in 2008) among the 50 States in total nonfuel mineral production value and accounted for 0.2% of the U.S. total value. On a per-capita-basis, the State ranked 37th in the Nation in its mineral industry's value of nonfuel mineral production; with a population of about 1.3 million, the value of production was about $89 per capita.

Mining in Hawaii consisted mostly of the quarrying of stone, used to produce crushed stone, and the extraction of sand and gravel from open pits. Both mineral commodities were produced for use by the construction industry. Gemstones, mostly black coral and precious coral, were also produced in significant quantities.

Crushed stone, by value, remained Hawaii's leading nonfuel mineral commodity, accounting for more than 87% of the State's total nonfuel mineral production value, followed by construction sand and gravel and gemstone. Hawaii's decrease in total nonfuel mineral production value was the result of decreases in the majority of the State's mineral commodity values, the largest decrease being that of crushed stone, down by $32 million, or 24%, followed by construction sand and gravel, down by $15 million, or 52%. Gemstone production value remained the same as in 2008.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN HAWAII[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	151	NA	151	NA	151
Sand and gravel, construction	1,850 r	24,100 r	1,640 r	29,800 r	1,130	14,300
Stone, crushed	8,800	141,000	7,410 r	134,000 r	5,920	101,000
Total	XX	165,000 r	XX	164,000 r	XX	116,000

rRevised. NA Not available. XX Not applicable

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
HAWAII: CRUSHED STONE SOLD OR USED, BY TYPE[1]

	2008			2009		
Type	Number of quarries	Quantity r (thousand metric tons)	Value r (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	-- r	--	--	--	--	--
Traprock	21 r	6,330	$115,000	19	5,180	$88,000
Volcanic cinder and scoria	4 r	366	5,630	3	121	1,540
Miscellaneous stone	9	711	13,100	8	623	11,500
Total	XX	7,410	134,000	XX	5,920	101,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
HAWAII: CRUSHED STONE SOLD OR USED BY
PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	W	W
Filter stone	W	W
Other coarse aggregate	240	6,150
Coarse aggregate, graded:		
Concrete aggregate, coarse	695	8,700
Other graded coarse aggregate	178	2,900
Fine aggregate (-⅜ inch):		
Stone sand, concrete	187	7,000
Other fine aggregate	190	4,340
Coarse and fine aggregates:		
Graded road base or subbase	158	2,570
Crusher run or fill or waste	416	3,890
Other coarse and fine aggregates	48	555
Other construction materials	5	98
Unspecified:[2]		
Reported	820	13,600
Estimated	2,950	50,700
Total	5,920	101,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to the totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
HAWAII: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	67	$1,430	$21.31
Asphaltic concrete aggregates and road base materials	344	4,390	12.77
Fill	132	$1,200	9.12
Unspecified:[2]			
Reported	94	615	6.54
Estimated	490	6,670	18.74
Total or average	1,130	14,300	12.70

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Estimated production without a breakdown by end use.

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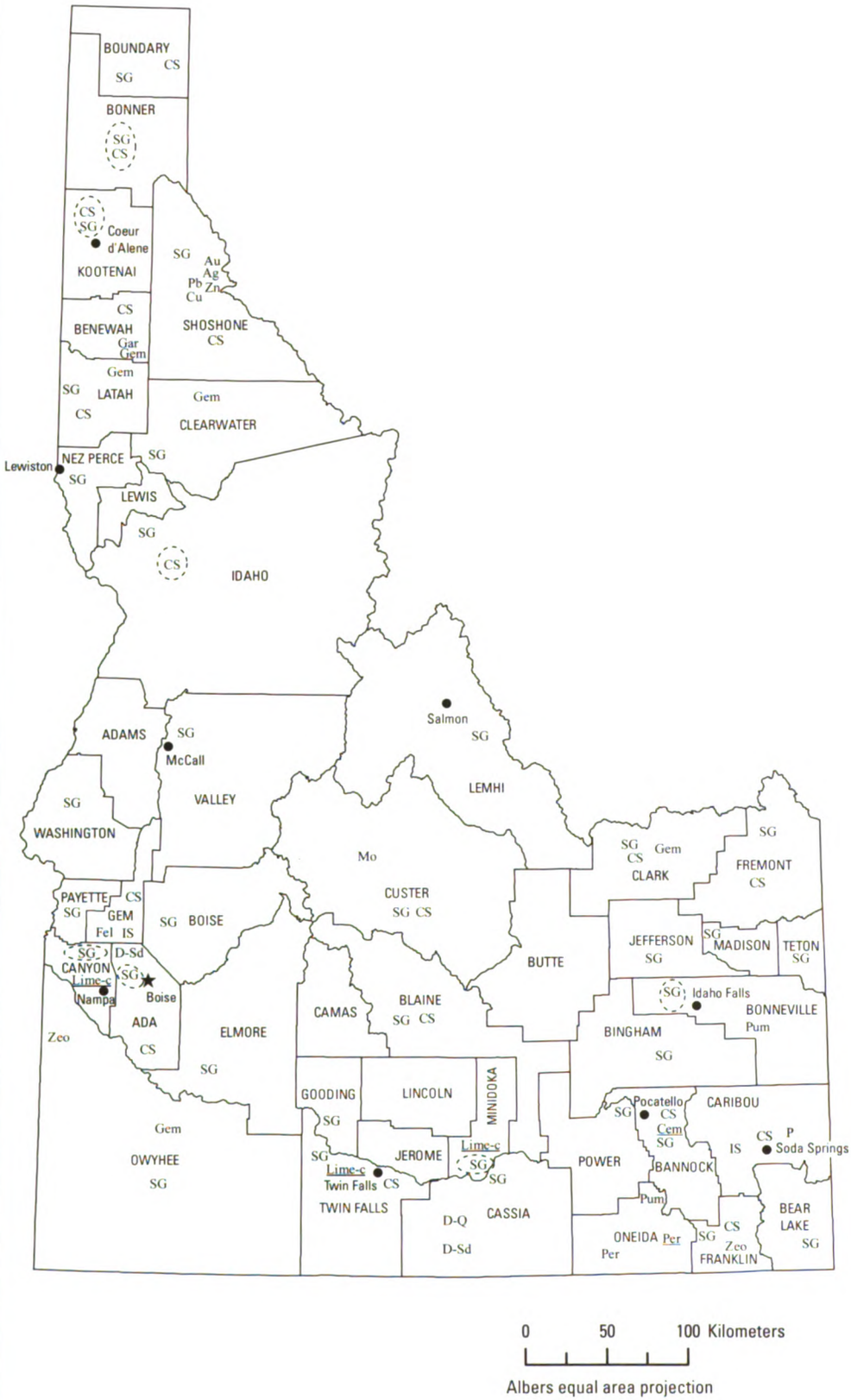
IDAHO



LEGEND

- County boundary
- ★ Capital
- ● City

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver
Au	Gold
Cem	Cement plant
Cu	Copper (byproduct)
CS	Crushed stone
D-Q	Dimension quartzite
D-Sd	Dimension sandstone
Fel	Feldspar
Gar	Garnet
Gem	Gemstones
IS	Industrial sand
Lime-c	Lime plant (captive)
Mo	Molybdenum
P	Phosphate rock
Pb	Lead
Per	Perlite
Per	Perlite plant
Pum	Pumice and pumicite
SG	Construction sand and gravel
Zeo	Zeolites
Zn	Zinc

Concentration of mineral operations

Source: Idaho Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF IDAHO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Idaho Geological Survey for collecting information on all nonfuel minerals.

In 2009, Idaho's nonfuel mineral production[1] was valued at $935 million based upon annual U.S. Geological Survey (USGS) data. This was a $136 million, or an almost 13%, decrease from the State's total nonfuel mineral production value of almost $1.1 billion in 2008, which followed a $291 million, or 37%, increase from the total production value of $781 million in 2007. Idaho rose to 21st from 24th in rank among the 50 States in total nonfuel mineral production value and accounted for about 1.6% of the U.S. total production value of $59 billion. Per capita, the State rose in rank from 8th to 7th in the Nation for its mineral industry's value of nonfuel mineral production. With a population of 1.55 million, the value of production was about $605 per capita, significantly down from the per capita production value of $698 in 2008.

Molybdenum concentrates, phosphate rock, silver, construction sand and gravel, and lead, in descending order of production value, accounted for 91% of the State's total nonfuel mineral production value in 2009. About 31% of the State's total nonfuel mineral value came from the production of industrial minerals, and the remaining 69% from the metals produced in the State: cadmium (as a byproduct of zinc concentrates), copper, gold, lead, molybdenum concentrates, silver, and zinc.

Despite the decrease in Idaho's total mineral production value, six commodities increased in value, led by increases in zinc (250%), followed by lime (10%), crude perlite (85%), gemstones (14%), cadmium (as a byproduct of zinc concentrates) (95%), and gold (12%) (data withheld for zinc, lime, crude perlite, cadmium, and gold—company proprietary data). Combined, these six commodities accounted for a $13 million increase in the State's total nonfuel mineral production value (table 1).

Zinc production rose from seventh to third among six producing States in 2009; New York had produced zinc in 2008 but reported no production in 2009. There also were mine closures in Montana, Tennessee, and Washington, which accounted for Idaho's increase in rank. The State also rose in rank for the production of gemstones (based upon value), from 8th to 5th among 50 producing States; feldspar, from 6th to 4th among 7 producing States; crude perlite, from 5th to 4th among 6 producing States; and, gold, from 11th to 10th, among 11 producing States. Most notably, the State declined in rank to fourth from third for both the production of pumice and pumicite and silver.

Idaho remained second in the production of zeolites among six producing States; third in the production of industrial garnets, lead, and phosphate rock, among three, five, and four producing States, respectively; fourth in the production of molybdenum concentrates; and seventh in the production of copper among seven producing States.

The following narrative information was provided by the Idaho Geological Survey[2] (IGS). IGS production data and information, except where otherwise noted, were based upon the agency's own surveys and mine inquiries, company annual reports, and data and information derived from other State government agency sources. These data may differ from USGS annual production figures, which were based upon company responses to USGS surveys and upon USGS estimates.

Overview

Mineral exploration activity rebounded in the second half of 2009, after a period of less investment and exploration activity, owing to the sharp economic downturn that began in late 2008. Most industrial mineral operations reflected the effects of decreased nationwide industrial and construction activity. Overall, Idaho's total nonfarm employment declined by 6.1% in 2009 (Idaho Division of Financial Management, 2010, p. 5), while mining employment declined by about 25% to just over 2,000 mining jobs (Idaho Division of Financial Management, 2010, p. 20).

Exploration and Development Activities

Metals

Cobalt.—Formation Metals Inc. (formerly Formation Capital Corp., of Vancouver, British Columbia, Canada) was in the final stages of receiving permits for its Idaho Cobalt project near the town of Salmon in Lemhi County. Following approval of its environmental impact statement (EIS) in January, Formation completed discussions with the Forest Service over bond requirements and other details, receiving approval to start construction in December (Formation Metals Inc., 2009). The project, which would produce nearly 1,400 metric tons (t) annually of super-alloy grade, high-purity cobalt metal, has a minimum 10-year mine life with potential for additional reserves (Formation Metals Inc., 2014).

Gold.—New Jersey Mining Co. (Kellogg, ID) focused efforts on their Toboggan joint venture with Newmont North America Exploration Ltd. (a subsidiary of Newmont Mining Corp., of Greenwood Village, CO) in the Murray area of Shoshone

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Virginia S. Gillerman, Research Geologist/Economic Geologist, authored the text of the State mineral industry information submitted by the Idaho Geological Survey.

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County. The large property position hosts several gold prospects and Newmont drilled two holes each on the Mineral Ridge, Golden Reward, and Gold Butte structures. The six holes totaled 1,400 meters (m) with the best intercept on the Gold Butte structure where a 4-meter interval assayed 2.52 grams per metric ton (g/t) gold (New Jersey Mining Co., 2009).

Elsewhere in northern Idaho, Premium Exploration (Vancouver, British Columbia, Canada) reported some excellent results from its two-phase drilling program at the Friday-Petsite gold project in the Elk City area in Idaho County. Premium's Phase One program followed up on a gold-in-soil anomaly and drilled seven holes; some extended the mineralized zone southward (Premium Exploration Inc., 2009a). Phase Two drilling in six HQ core holes totaled 2,000 m and intersected down-dip, high-grade values below the bulk-tonnage target (Premium Exploration Inc., 2009b).

In early 2009, Midas Gold Corp. (Vancouver, British Columbia, Canada) acquired the Stibnite property in Valley County, which had been held by Gold Crest Mines. Midas renamed the property Golden Meadows (Midas Gold Corp., 2014).

Atlanta Gold Inc. (Toronto, Ontario, Canada) changed their mine plan in response to both the increased price of gold and local community opposition to a proposed large open pit at the Atlanta gold-silver deposit, 90 km northeast of Boise in Elmore County. The company announced in a Canadian National Instrument (NI) 41–101 report released in April that they would focus exploration on a small open pit and underground mining operation. The updated reported measured and indicated resource is 2.7 million metric tons (Mt) of ore grading 5.28 g/t (0.154 troy ounces per short ton), or 14,300 kg (460,000 troy ounces) gold with over 31,000 kg (one million troy ounces) silver (Atlanta Gold Inc., 2009a). Atlanta was also looking into a potential tungsten byproduct, and purchased several mine buildings, generators, and other facilities from Newmont (Atlanta Gold Inc., 2009b).

Molybdenum.—Gentor Resources, Inc. (Toronto, Ontario, Canada) continued to hold the lease and maintain the IMA mine molybdenum-tungsten-silver property at Patterson in Lemhi County. Drilling in 2008 confirmed an inferred resource of 5.2 Mt grading 0.15% molybdenum with exploration potential, but funding limitations restricted activities in 2009 (Gentor Resources Inc., 2009).

Polymetallic Projects.—In November, Mosquito Consolidated Gold Mines Ltd. (Vancouver, British Columbia, Canada) released a preliminary economic assessment and scoping study of the CUMO molybdenum-copper porphyry deposit near the Grimes Creek headwaters in Boise County. The deposit was optioned to Mosquito by Cumo Molybdenum Mining Inc. in 2004, but is now 100% owned by American CuMo Mining Corp. (American CuMo Mining Corp., 2009, p. 1). The study identified and reported 598 million t of indicated resource grading 0.11% molybdenum oxide and 0.06% copper as ore. The study, authored by Ausenco, looked at throughput rates of 45,000 to 181,000 tons per day (tpd) for the 1.8 billion t deposit (American CuMo Mining Corp., 2009).

Rare Earths.—Thorium Energy changed its name to U.S. Rare Earths, Inc., and refocused the company to concentrate on rare-earth-element (REE) exploration and did additional surface work and claim staking in Lemhi County. The company holds land in the Lemhi Pass and Diamond Creek thorium-REE districts and elsewhere.

Commodity Review

Industrial Minerals

Garnets.—Emerald Creek Garnet Ltd. (Fernwood, ID), a subsidiary of WGI Heavy Minerals (Waterdown, Ontario, Canada), used the market slowdown to make operational improvements at their industrial garnet mine near Fernwood, in Benewah County, in northern Idaho. The company increased production, cut costs, and focused on customer service. The result was an improved market and process outlook by the third quarter. Emerald hired a geologist to better understand the mineral deposit and explore for additional garnet deposits. The Emerald Creek Mine processes alluvial garnets using two wash plants and the flat screens that were installed in 2008.

Perlite and Pumice.—Hess Pumice, a locally owned company in Malad, reported significantly lower sales volume and a 43% drop in pumice production, owing to the significant decline in demand from the construction market. The company had to reduce the number of employees but used the downturn year to remodel the grinding plant for newer products such as filler. Hess has been a leader in aggressively marketing the pumice for a wide variety of uses domestically and internationally. That effort has helped reduce the effect of a slumping construction industry, which uses the pumice for lightweight aggregate. The company also conducted research and development testing on alkali-resistant concrete. Idaho Minerals, also owned by Hess, saw perlite sales drop slightly.

Phosphate Rock.—Mining continued at southeast Idaho's three open pit phosphate mines in Caribou County. Three processing plants also were in operation, including North America's only elemental phosphorus plant, located at Soda Springs and owned and operated by Monsanto Co. (St. Louis, MO). Ore is shipped by trucks with triple trailers from the South Rasmussen Mine to the Monsanto plant.

J.R. Simplot Co.'s (Boise, ID) Don Plant in Pocatello County produced phosphoric acid and fertilizer. Simplot mined panel E, the last phase of the existing Smoky Canyon Mine, on the Idaho-Wyoming border, 16 km west of Afton, WY. Ore is crushed and sent by a 140-kilometer (87-mile) long slurry pipeline to their Don plant in Pocatello for manufacturing into fertilizer (J.R. Simplot Co., 2014). The company awaited judicial decisions on the fate of panels F and G in the southward expansion of the mine. The U.S. Department of the Interior's Bureau of Land Management and the U.S. Department of Agriculture's U.S. Forest Service approved the expansion in mid-2008 (U.S. Bureau of Land Management, 2008), but the Record of Decision was appealed to the United States Courts for the Ninth Circuit's Court of Appeals by the Greater Yellowstone Coalition and other environmental groups. The existing mine was expected to run out of ore in 2009. The Appeals Court lifted a stay on development in August (Boone, 2009).

Agrium Inc.'s (Calgary, Alberta, Canada) plant at Conda, in Caribou County, produced phosphoric acid and fertilizer.

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Agrium also mined the final stages of the Dry Valley Mine, including D pit, the furthest to the south, and reclaimed the C pit. The company prepared to transition operations back to the previously permitted North Rasmussen Ridge Mine because the Dry Valley ores were exhausted.

Sand and Gravel, Construction, and Stone, Crushed.—Aggregate, in the form of construction sand and gravel and crushed stone, is one of the most widespread mineral industries in Idaho. There was significant negative impact on the industry owing to the downturn in the construction industry, especially the residential housing market in the State.

Zeolites.—Bear River Zeolite (Preston, ID), a subsidiary of U.S. Antimony Corp. (Thompson Falls, MT), continued to operate the zeolite mine and plant at Preston, in Franklin County in southeastern Idaho. Bear River marketed their material for a variety of uses, including filtration, agricultural feeds and carriers, and pozzolan. Value and tonnage of production declined very slightly in 2009 and the company managed to decrease costs. The company added silos and conveyors at the plant.

Metals

Molybdenum.—Thompson Creek Metals Co. Inc. (Littleton, CO) reduced personnel and production slightly during the first half of 2009 at their Thompson Creek molybdenum mine near Challis in Custer County owing to the 2008 economic recession and lower molybdenum prices (Thompson Creek Metals Co. Inc., 2009a). Full production was slated to resume in January 2010 (Thompson Creek Metals Co. Inc., 2009b). The Thompson Creek Mine produced 8,100 t (17.8 million pounds) of molybdenum concentrate in 2009 (Thompson Creek Metals Co. Inc., 2009c, p. 16).

Silver.—Hecla Mining Co. (Coeur d'Alene, ID) reported that the third quarter of 2009 was one of the best in its history, with a record number of tons of ore and silver ounces mined at their Lucky Friday Mine near Mullan in Shoshone County. Hecla owned and operated two mines: the Lucky Friday and the Greens Creek Mine in Alaska. The Lucky Friday Mine produced 110,000 kg (3.53 million troy ounces) of silver in 2009, a 23% increase over 2008's total of approximately 90,000 kg (2.88 million troy ounces) (Hecla Mining Co., 2010, p. 14).

U.S. Silver Corp. (Toronto, Ontario, Canada) reported record silver and lead production at their Galena mine in the Silver Valley. In 2009, the mine produced 75,500 kg (2.43 million troy ounces) of silver, almost 3,000 t (6.4 million pounds) of lead, and 488 t (1.08 million pounds) of copper. The silver total represented a 41% increase over 2008 (U.S. Silver Corp, 2010).

The Sunshine Mine, near Coeur d'Alene, remained closed for the year. Sterling Mining Co. (Coeur d'Alene, ID) filed for Chapter 11 bankruptcy in March. In November, Alberta Star Development Corp. (Vancouver, British Columbia, Canada) announced that it had reached an agreement to acquire 100% ownership of Sterling's assets, including the Sunshine Mine (Alberta Star Development Corp., 2009). The mine had produced over 11,200 t (360 million troy ounces) of silver since 1904; a Canadian NI 43-101 compliant 2007 report by Behre Dolbear & Co. estimated a remaining measured and indicated resource of 980,000 kg (31.5 million troy ounces) of silver with additional inferred resources (Alberta Star Development Corp., 2009).

Government Programs and Other Activities

The IGS continued to do geologic mapping through participation in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. The IGS published 17 digital geologic maps and 10 additional publications in 2009, in addition to indexing, preserving, and scanning old mine files, mine maps, and oil well logs through funding from the USGS and the Idaho Department of Lands.

Kinross Gold Corp. received the 2009 Hardrock Mineral Environmental Award from the BLM for their closure work at the DeLamar Mine in Owyhee County. Kinross constructed a geotech-engineered water management pond to assist in dewatering the tailings pond (U.S. Bureau of Land Management, 2009).

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN IDAHO[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	339	NA	430	NA	491
Sand and gravel, construction	24,200 r	127,000 r	18,800 r	107,000 r	12,900	75,000
Stone,						
Crushed	6,170	37,500	5,950 r	38,800 r	4,410	30,800
Dimension, quartzite, sandstone	34	4,200	34	4,130	25	3,370
Combined values of cadmium (byproduct from zinc concentrates), cement (portland), copper, feldspar, garnet (industrial), gold, lead, lime, molybdenum concentrates, perlite (crude), phosphate rock, pumice and pumicite, sand and gravel (industrial), silver, zeolites, zinc	XX	612,000	XX	921,000	XX	826,000
Total	XX	781,000 r	XX	1,070,000	XX	935,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

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TABLE 2

IDAHO: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	6	1,170	$7,060	6	237	$3,430
Granite	10	544	2,980	7	282	1,390
Traprock	30 r	1,500 r	7,640 r	38	1,710	8,660
Sandstone and quartzite	-- r	-- r	-- r	--	--	--
Miscellaneous stone	20 r	2,730 r	21,100 r	25	2,180	17,400
Total	XX	5,950 r	38,800 r	XX	4,410	30,800

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3

IDAHO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	15	107
Other coarse aggregate	20	149
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Fine aggregate (-⅜ inch):		
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Coarse and fine aggregates:		
Graded road base or subbase	913	4,050
Unpaved road surfacing	188	904
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	15	53
Other coarse and fine aggregates	5	23
Agricultural:		
Limestone	W	W
Poultry grit and mineral food	W	W
Special, mine dusting or acid water treatment	W	W
Other miscellaneous uses and specified uses not listed	306	3,960
Unspecified:[2]		
Reported	1,140	9,250
Estimated	1,050	7,170
Total	4,410	30,800

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
IDAHO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	1,270	$9,530	$7.48
Asphaltic concrete aggregates and other bituminous mixtures	213	1,790	8.41
Road base and coverings	1,940	10,800	5.56
Fill	189	645	3.41
Snow and ice control	43	192	4.47
Other miscellaneous uses[3]	30	228	7.60
Unspecified:[4]			
Reported	3,660	20,800	5.69
Estimated	5,540	31,000	5.60
Total or average	12,900	75,000	5.82

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes filtration and railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

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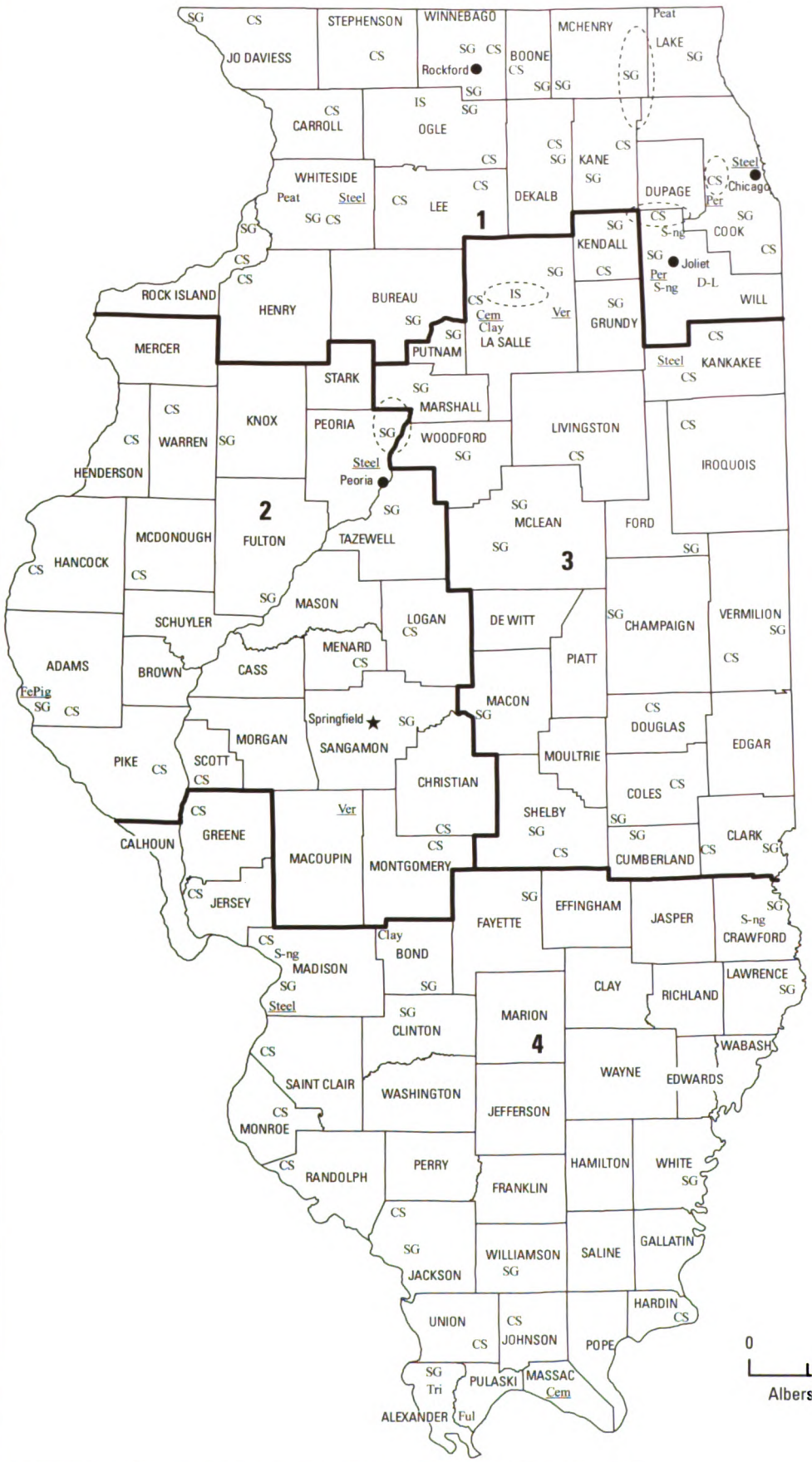
ILLINOIS



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-L	Dimension limestone
FePig	Iron oxide pigments plant
Ful	Fuller's earth
IS	Industrial sand
Peat	Peat
Per	Perlite
SG	Construction sand and gravel
S-ng	Sulfur (natural gas)
Steel	Steel plant
Tri	Tripoli
Ver	Vermiculite plant
⬭	Concentration of mineral operations

Source: Illinois State Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF ILLINOIS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Illinois State Geological Survey for collecting information on all nonfuel minerals.

In 2009, Illinois' nonfuel raw mineral production[1] was valued at $929 million, based upon annual U.S. Geological Survey (USGS) data. This was a $281 million, or 23%, decrease from the State's total nonfuel mineral value of $1.21 billion in 2008, which decreased by $40 million, or 3%, from the 2007 production value total of $1.25 billion. This was the first year since 2003 that the State's nonfuel total production value was less than $1 billion. The State ranked 22d, down from 20th in 2007–08, among the 50 States in the total nonfuel raw mineral production value and accounted for about 1.6% of the U.S. total, comparable to the total production values of the States of Idaho and New Mexico.

Industrial minerals continued to account for all of Illinois' nonfuel mineral production in 2009. Crushed stone remained Illinois' leading nonfuel mineral commodity, accounting for 55% of the State's total nonfuel mineral production value, followed by, in descending order of value, construction sand and gravel, 16%; portland cement, 15%; and industrial sand and gravel, 11% (table 1).

Tripoli was the only mineral commodity produced in the State that had no decrease in production or production value from 2008 to 2009, based on reported data, although production and production value remained down by 18% and by 3%, respectively, from those of 2007 (actual values withheld—company proprietary data). The primary drivers of the State's decrease in total production value during the year were the decreases in the production values of portland cement, down by $122 million, following a $46-million decline from 2007 to 2008; crushed stone, down by $100 million; and construction sand and gravel, down by $24 million. Production values of crushed stone and construction sand and gravel had declined by $1 million and $9 million, respectively, from 2007 to 2008. The largest decrease in production took place with crushed stone, down by 11.1 million metric tons (Mt), followed by construction sand and gravel, down by 4.5 Mt, and portland cement, down by 1.17 Mt.

In 2009, Illinois continued to be first in the quantities of industrial sand and gravel produced, accounting for almost 14% of all industrial sand and gravel produced in the Nation. The State returned to first from second (the State had been first in 2007) for tripoli production out of 4 producing States, increased to third from fifth in peat (peat production reported as sales) out of 12 producing States, and increased to fourth from fifth for the production of crushed stone. The State continued to decline in rank in portland cement production, having ranked 9th in 2007, 10th in 2008, and 15th in 2009. Raw steel continued to be produced in Illinois, but it was processed from ores and scrap metal obtained from other domestic and foreign sources. Other mineral products produced in the State in 2009 included iron oxide pigments, expanded perlite, and vermiculite products.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN ILLINOIS[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	3,120	309,000 e	2,660	263,000 e	1,490	141,000 e
Clays, fuller's earth	W	W	112	W	W	W
Gemstones, natural	NA	34	NA	10	NA	9
Sand and gravel:						
Construction	32,100 r	177,000 r	27,000 r	168,000 r	22,500	144,000
Industrial	4,090	86,800	3,980	108,000	3,440	104,000
Stone, crushed	78,400	614,000	67,600 r	613,000 r	56,500	513,000
Combined values of clays (common), lime (2007-08), peat, stone (dimension dolomite), tripoli, and values indicated by symbol W	XX	61,100	XX	60,900	XX	26,900
Total	XX	1,250,000	XX	1,210,000 r	XX	929,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

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TABLE 2
ILLINOIS: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	116	48,900	$421,000	118	44,700	$384,000
Dolomite	19	16,700	176,000	16	11,100	123,000
Sandstone and quartzite	5	1,940	15,400	4	653	5,930
Miscellaneous stone	1 r	36 r	332 r	2	42	245
Total	XX	67,600 r	613,000 r	XX	56,500	513,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
ILLINOIS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	25	193
Riprap and jetty stone	350	3,860
Filter stone	52	434
Other coarse aggregate	1,500	15,800
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,130	8,180
Bituminous aggregate, coarse	761	6,190
Bituminous surface-treatment aggregate	297	2,960
Railroad ballast	36	399
Other graded coarse aggregate	7,910	72,200
Fine aggregate (-⅜ inch):		
Stone sand, concrete	106	1,120
Stone sand, bituminous mix or seal	239	1,680
Screening, undesignated	99	418
Other fine aggregate	4,700	47,100
Coarse and fine aggregates:		
Graded road base or subbase	2,690	17,100
Unpaved road surfacing	1,090	7,420
Crusher run or fill or waste	86	583
Other coarse and fine aggregates	2,530	19,700
Other construction materials	182	1,510
Agricultural:		
Limestone	1,200	7,050
Poultry grit and mineral food	W	W
Other agricultural uses	20	150
Chemical and metallurgical, cement manufacture	W	W
Special:		
Mine dusting or acid water treatment	W	W
Asphalt fillers or extenders	W	W
Other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	53	382
Unspecified:[2]		
Reported	10,000	119,000
Estimated	18,800	159,000
Total	56,500	513,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
ILLINOIS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W	444	4,450
Coarse aggregate, graded[3]	W	W	W	W	2,520	20,900	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	1,080	9,820	W	W
Coarse and fine aggregates[5]	2,000	13,600	668	4,210	1,340	9,590	2,390	17,400
Other construction materials	--	--	37	241	2	17	142	1,250
Agricultural[6]	W	W	W	W	586	4,870	366	1,820
Chemical and metallurgical[7]	--	--	--	--	W	W	W	W
Special[8]	43	126	W	W	W	W	--	--
Other miscellaneous uses	--	--	33	241	19	142	--	--
Unspecified:[9]								
Reported	6,800	81,300	1,830	20,700	635	7,590	768	9,180
Estimated	9,700	84,400	977	9,140	2,570	23,600	5,510	42,200
Total	29,100	279,000	4,550	40,100	10,000	88,800	12,800	105,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes stone sand (bituminous mix or seal), stone sand (concrete), screening (undesignated), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone, poultry grit and mineral food, and other agricultural uses.

[7]Includes cement manufacture.

[8]Includes asphalt fillers or extenders, mine dusting or acid water treatment, and other fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

TABLE 5
ILLINOIS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,140	$31,200	$6.08
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	1,500	10,400	6.91
Asphaltic concrete aggregates and other bituminous mixtures	1,180	9,030	7.66
Road base and coverings[3]	732	6,550	8.94
Fill	1,000	5,750	5.73
Snow and ice control	18	73	4.06
Railroad ballast	12	68	5.67
Filtration	14	199	14.21
Other miscellaneous uses[4]	34	425	12.50
Unspecified:[5]			
Reported	1,170	8,690	7.42
Estimated	11,700	71,700	6.13
Total or average	22,500	144,000	6.40

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes golf course and roofing granules.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6

ILLINOIS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	3,820	25,700	121	691	1,470	8,660
Asphaltic concrete aggregates and other bituminous mixtures	396	3,440	W	W	756	5,420
Road base and coverings[3]	259	2,350	W	W	201	1,760
Fill	477	3,110	177	923	140	764
Railroad ballast	12	68	--	--	--	--
Other miscellaneous uses[4]	22	198	73	753	21	194
Unspecified:[5]						
Reported	741	5,450	14	92	259	2,250
Estimated	4,790	27,900	3,800	23,500	2,490	16,300
Total	10,500	68,200	4,180	26,000	5,340	35,300

	District 4	
Use	Quantity	Value
Concrete aggregate and concrete products[2]	1,230	6,530
Asphaltic concrete aggregates and other bituminous mixtures	W	W
Road base and coverings[3]	W	W
Fill	210	952
Railroad ballast	--	--
Other miscellaneous uses[4]	248	2,160
Unspecified:[5]		
Reported	156	901
Estimated	635	4,050
Total	2,480	14,600

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration, golf course, roofing granules, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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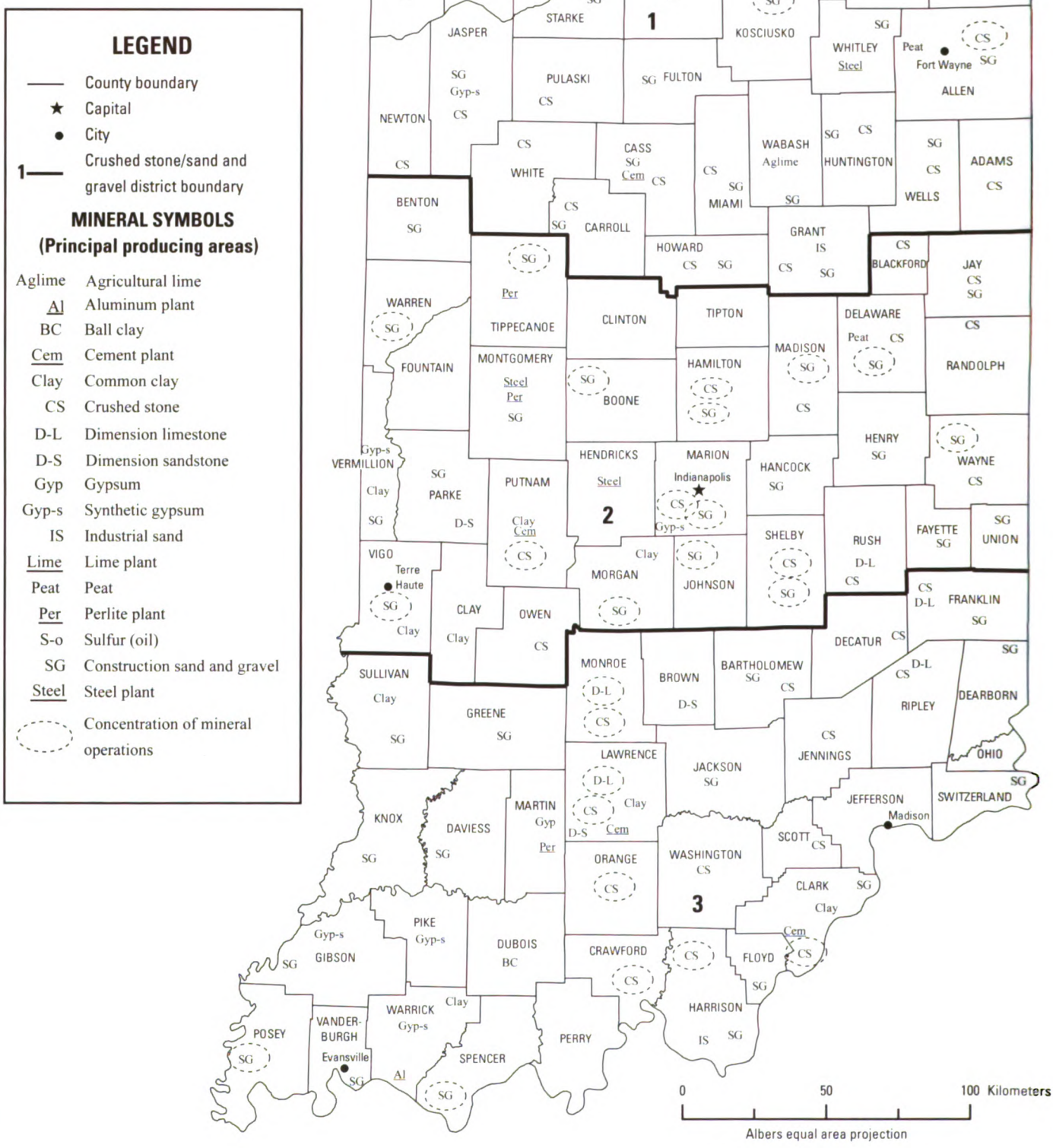

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THE MINERAL INDUSTRY OF INDIANA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Indiana Geological Survey for collecting information on all nonfuel minerals.

In 2009, Indiana's nonfuel raw mineral production[1] was valued at $806 million, based on annual U.S. Geological Survey (USGS) data. This was an $86 million, or 10%, decrease from the State's total nonfuel mineral production value of $892 million in 2008, which had decreased by $94 million, or 10%, from a total of $986 million in 2007. The State remained 25th in rank among the 50 States in total nonfuel raw mineral production value and accounted for 1.4% of the U.S. total production value. Per capita, the State ranked 26th in the Nation; with a population of about 6.42 million, the value of production was about $125 per capita.

Crushed stone, by production value, continued to be Indiana's leading nonfuel mineral commodity, followed by portland cement, and construction sand and gravel. The combined values of these three mineral commodities accounted for 77% of the State's total nonfuel mineral production value. The largest increase in value of Indiana's nonfuel mineral commodities took place in lime (actual values withheld—company proprietary data), followed by portland cement (up by $7 million), dimension stone (up by $5.9 million), and industrial sand and gravel (withheld—company proprietary data) (table 1). The largest decreases were observed in crushed stone (down by $62 million) and construction sand and gravel (down by $39 million). Smaller, yet significant, decreases took place, in order of decreasing production value, in masonry cement, crude gypsum, common clays, and ball clays. The production values of natural gemstones and peat remained the same as those of 2008.

In 2009, Indiana rose in rank in the quantity produced of several mineral commodities in comparison with other producing States. The State rose in rank to 2d from 6th in masonry cement, to 4th from 8th in crude gypsum, to 8th from 10th in crushed stone, and to 8th from 11th in portland cement. The State continued to be 3d in dimension stone production, 5th in ball clay production out of 5 producing States, 6th in peat production (based on sales), 8th in lime production, and 15th in construction sand and gravel production. Indiana declined in rank to 12th from 10th in the production of common clays. With 16.7 million metric tons (Mt), Indiana accounted for 28% of the 59.4 Mt of total raw steel produced in the United States in 2009 and continued to be the top raw-steel-producing State (American Iron and Steel Institute, 2010, p. 74).

The Indiana Geological Survey[2] (IGS) provided the following narrative information based upon its own surveys, estimates, and data collection efforts.

Employment

The United States Department of Labor, Mine Safety and Health Administration reported an average of 3,103 individuals employed in Indiana's nonfuel mineral sector during 2009. This represented a 10% decrease from 2008 employment levels.

Commodity Review

Industrial Minerals

Clay and Shale.—Commercial production and shipments began in April at the new Brampton Brick Ltd. brick plant in Farmersburg, Sullivan County (Brampton Brick Ltd., 2009, p. 4). The approximately 19,000-square-meter (-m^2) plant had a capacity to produce 100 million bricks per year from an abundant shale resource next to the plant. The Farmersburg plant used a mixture of petroleum coke and natural gas for fuel and used scrubbers to remove sulfur dioxide. The plant began the year operating at about 50% of its production capacity (Greninger, 2009a).

Boral Brick, Inc.'s Terre Haute plant in Vigo County was temporarily idled in February owing to the downturn of the economy and a lowered demand for its products. The plant will continue to sell bricks already produced. The approximately 28,000-m2 plant was the largest brick manufacturing facility in the United States, with a capacity to produce 120 million bricks per year. The plant used methane from a nearby landfill as fuel and nearby abandoned coal mine spoils, and a nearby active shale mine operated by Dennis Trucking Co., Inc. provided the shale for the brick making (Greninger, 2009b).

Hydraulic Press Brick Company in Morgan County, which produces an expanded shale product, applied for exemptions to county requirements regarding hours of operation, a reclamation plan, and stormwater runoff. The county agreed to accept the reclamation plan filed with the State and also allowed the company to change its hours of operation but did not allow the exemption for stormwater runoff.

Gypsum.—Roy's Recycling, Inc. began operations crushing and recycling the natural and synthetic gypsum in wallboard.

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[2]Kathryn R. Shaffer, Mineral Statistician with the Indiana Geological Survey, submitted the text of the State mineral industry information provided by that State agency.

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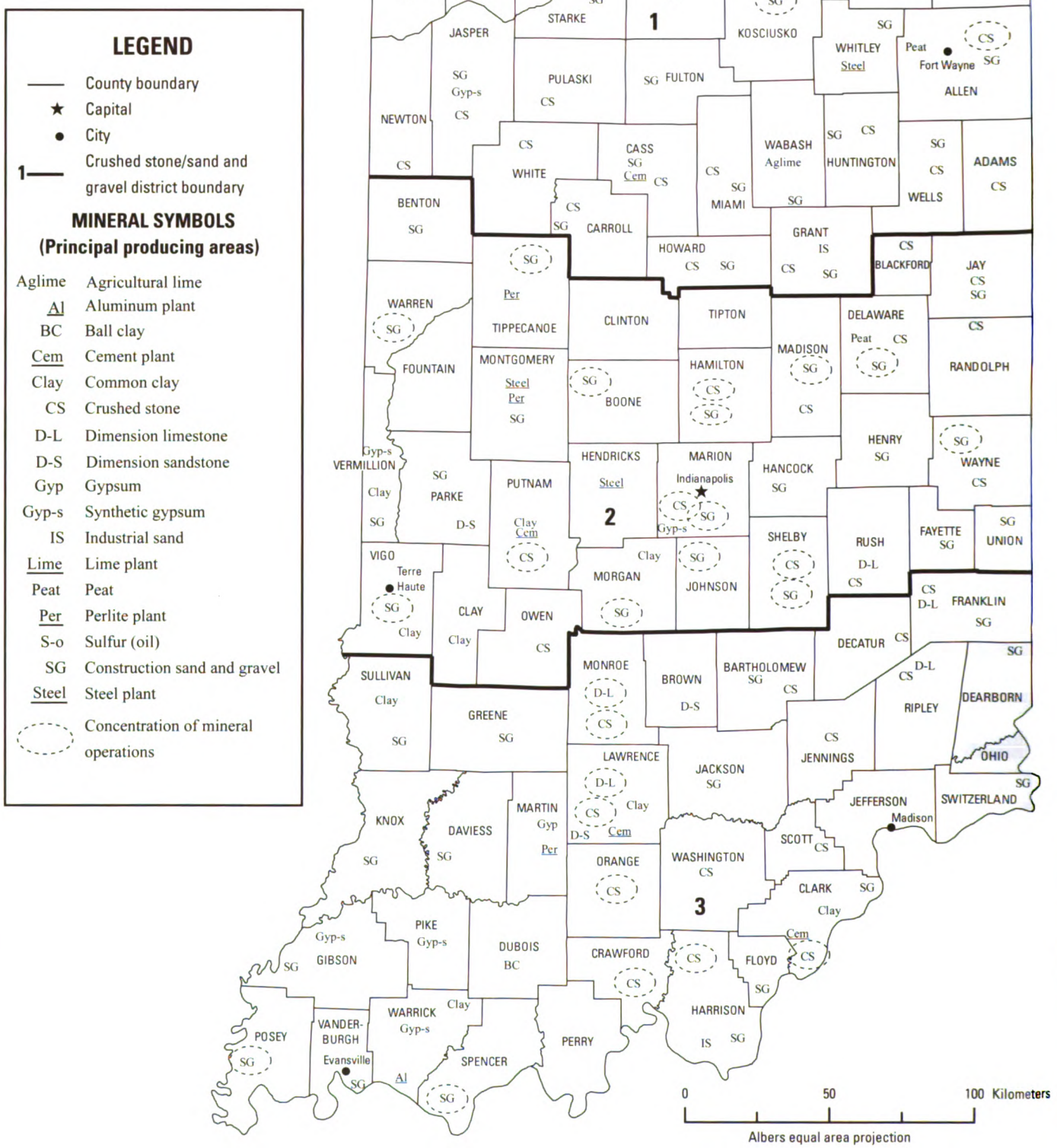

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Commodity Review

Industrial Minerals

Clay and Shale.—Commercial production and shipments began in April at the new Brampton Brick Ltd. brick plant in Farmersburg, Sullivan County (Brampton Brick Ltd., 2009, p. 4). The approximately 19,000-square-meter (-m^2) plant had a capacity to produce 100 million bricks per year from an abundant shale resource next to the plant. The Farmersburg plant used a mixture of petroleum coke and natural gas for fuel and used scrubbers to remove sulfur dioxide. The plant began the year operating at about 50% of its production capacity (Greninger, 2009a).

Boral Brick, Inc.'s Terre Haute plant in Vigo County was temporarily idled in February owing to the downturn of the economy and a lowered demand for its products. The plant will continue to sell bricks already produced. The approximately 28,000-m2 plant was the largest brick manufacturing facility in the United States, with a capacity to produce 120 million bricks per year. The plant used methane from a nearby landfill as fuel and nearby abandoned coal mine spoils, and a nearby active shale mine operated by Dennis Trucking Co., Inc. provided the shale for the brick making (Greninger, 2009b).

Hydraulic Press Brick Company in Morgan County, which produces an expanded shale product, applied for exemptions to county requirements regarding hours of operation, a reclamation plan, and stormwater runoff. The county agreed to accept the reclamation plan filed with the State and also allowed the company to change its hours of operation but did not allow the exemption for stormwater runoff.

Gypsum.—Roy's Recycling, Inc. began operations crushing and recycling the natural and synthetic gypsum in wallboard.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Kathryn R. Shaffer, Mineral Statistician with the Indiana Geological Survey, submitted the text of the State mineral industry information provided by that State agency.

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Roy's Recycling and Cheron, Inc. produce a product called Gypsoil, which is used as an agricultural soil amendment.

Sand and Gravel.—Vulcan Materials Company split its operations into east region and west region business units, with Indiana in the west region, which comprises mostly quarries. Reavis Mining in Madison County was the only sand and gravel operation to commence operations in 2009. Mauckport Sand and Gravel acquired Lucas Corp.'s Plant 1 in Harrison County; Heritage Aggregates, LLC acquired Harco Sand and Gravel, Inc. in Marion County and renamed it the "Harding Street Plant." There were several closures during 2009: Bell Aggregates and Trucking in Vigo County; Bottamiller Enterprises, Inc. in Hamilton County; Clark Farm Aggregates in Elkhart County; Engineering Aggregates Corp.'s Portable #1 in Cass County; Fidler, Inc.'s Pit #3 in Elkhart County; Kopetsky Hauling, Inc.'s Kopetsky Sand and Gravel in Marion County; Martinsville Rockmakers, Inc.'s MRI Sand and Gravel in Morgan County; Noblesville Landfill, Inc. in Hamilton County; Rieth-Riley Materials' Mooresville plant in Morgan County; Silver Creek Sand and Gravel Company, Inc.'s Five Mile Lane plant in Floyd County; Tri-County Sand and Gravel, LLC in Union County; and Vulcan Construction Materials' Bass Lake Sand and Gravel in Starke County.

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Stone, Dimension.—The Indiana Limestone Institute of America reported that commercial construction was low owing to the state of the economy, but the demand for high-end residential architecture and restoration work remained steady. Many Indiana companies were active in the residential market, and the eastern and southern parts of the United States were key areas for this work. The trend towards the restoration of older buildings was also on the upswing. The Indiana limestone industry has been actively involved in the restoration market since many older, particularly governmental and educational, buildings were originally built using Indiana limestone. The stone is virtually maintenance free, requiring only the periodic repointing of joints and, if desired, occasional cleaning. Owing to general neglect and a lack of maintenance over the years, many buildings have fallen into disrepair. The ability of the industry to easily match stones quarried up to 100 years ago with stone quarried today, and to match stone to existing buildings is a big factor in the restoration market. Building restoration using limestone is a steady segment of the market. In many instances, Indiana limestone has also been used to replace often highly detailed but less durable stones.

Owing to many projects completed in 2009, Indiana dimension limestone withstood the economic downturn. The new Yankee Stadium, which opened in New York City in April, is composed of approximately 6,700 m^2 of limestone quarried from the Indiana Limestone Company's Empire Quarry in Lawrence County and milled by Indiana Limestone Fabricators in Owen County. The façade is also composed of granite from Canada. The limestone in the Great Hall and on the "Legends Suites" boxes was provided by the Victor Oolitic Stone Company's Victor Quarry, located in Monroe County. A custom-designed machine to cut the letters was designed by W.F. Meyers Co. in Lawrence County (Parsons, 2009).

The Indiana Limestone Company contributed stone for other jobs, including Simon Hall on the Indiana University Bloomington campus, and the Raleigh Convention Center in Raleigh, North Carolina, both completed in 2009. Victor Oolitic Stone Company, which had been mining since 1898, was acquired by Resilience Capital Partners. In August, Star Stone Company, Inc. closed its Patton Hill Quarry in Lawrence County.

Metals

Aluminum.—Alcoa Corp. announced in January that it was cutting 15,000 jobs worldwide, 1,700 of which were contractors. Included in that total were 100 jobs at the Warrick operation in Warrick County, which was announced in October 2008 (Alcoa Corporation, 2009). The plant was not affected as dramatically by the recession as were some other Alcoa operations.

Steel.—Owing to a reduction in demand, ArcelorMittal USA in Lake County closed its Indiana Harbor East specialty bar operation in February for a few weeks (Holecek, 2009a). About 500 employees were laid off early in the year at Burns Harbor, and another 900 employees worked fewer hours. Other small layoffs took place during the year, and the company temporarily stopped various employee incentive programs (Holecek, 2009b). It also temporarily laid off 700 employees at the Indiana Harbor plants in July (Times of Northwest Indiana Staff, 2009a). Blast furnace No. 7 remained operational at Indiana Harbor East, but ironmaking was halted at Indiana Harbor West. Owing to an improved market, ArcelorMittal's Indiana Harbor operation restarted the No. 5 blast furnace in July after 8 months of inactivity and the No. 6 blast furnace in October after 2 years of inactivity (Tweh, 2009a). In November, the Indiana Harbor facility received a $31.6 million American Recovery and Reinvestment Act grant from the U.S. Department of Energy for a project to capture waste gas from the blast furnace and use it to produce electricity and steam for use at the plant (Tweh, 2009b). In December, ArcelorMittal announced plans to eliminate 10,000 jobs worldwide in 2010. They also planned to resume mergers, acquisitions, and other investment activities to capture selected growth opportunities in emerging markets (ArcelorMittal S.A., 2010, p. 23). The effects on Indiana mills, if any, are currently unknown. Near yearend, the company was under scrutiny by the Indiana Department of Environmental Management for their waste disposal methods at the Burns Harbor facility and worked on getting a landfill permit (Times of Northwest Indiana Staff, 2009b).

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the amount of coal burned. In addition, the process, to some extent, reduces the use of sand and shale as raw materials in cement production. The Environmental Management System of Essroc Cement Corp.'s Logansport Plant in Cass County received ISO 14001 certification from Lloyd's Register Quality Assurance in the United Kingdom. The company belongs to the Italcementi Group, headquartered in Bergamo, Italy. This was international recognition that the plant met high environmental standards. The company's plant in Clark County and two company plants in Pennsylvania also hold this certification. Three Lehigh Hanson, Inc. quarries received awards from the National Stone, Sand & Gravel Association's National Stars of Excellence program for 2009. The company's Harding Street Quarry in Marion County received an Environmental Excellence Silver Award, and its Limedale and Putnamville Quarries, both in Putnam County, each received an Environmental Excellence Bronze Award (National Stone, Sand & Gravel Association, 2010, p. 14–15). J.C. Stone, Inc. won a 2009 Pinnacle Award from the Marble Institute of America, recognizing the use of dimension stone in high-quality construction projects, for renovations and additions to the Bowdoin College Museum of Art in Brunswick, Maine, using stone from the Indiana Limestone Company (Marble Institute of America, 2009).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN INDIANA[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	2,980	263,000 e	2,590	226,000 e	2,690	233,000 e
Clays, common	624	8,980	667	8,080	413	6,610
Gemstones, natural	NA	4	NA	4	NA	4
Sand and gravel, construction	28,300	154,000 r	23,300 r	139,000 r	18,800	100,000
Stone:						
Crushed	57,800	383,000	51,800 r	352,000 r	44,100	290,000
Dimension	236	37,800	203	35,600	206	41,500
Combined values of cement (masonry), clays (ball), gypsum (crude), lime, peat, sand and gravel (industrial)	XX	140,000 r	XX	131,000 r	XX	134,000
Total	XX	986,000 r	XX	892,000 r	XX	806,000

eEstimated. rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

TABLE 2
INDIANA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

	2008			2009		
Type	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	79 r	47,200 r	$320,000	81	40,200	$259,000
Dolomite	13	4,660 r	32,500 r	13	3,830	30,200
Miscellaneous stone	1	13	85	1	89	550
Total	XX	51,800 r	352,000 r	XX	44,100	290,000

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
INDIANA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	403	3,530
Filter stone	W	W
Other coarse aggregate	1,710	9,280
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,080	17,800
Bituminous aggregate, coarse	1,140	9,890
Bituminous surface-treatment aggregate	1,320	14,400
Railroad ballast	312	2,480
Other graded coarse aggregate	4,120	23,700
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	167	582
Other fine aggregate	2,890	15,700
Coarse and fine aggregates:		
Graded road base or subbase	2,920	19,300
Unpaved road surfacing	598	3,940
Crusher run or fill or waste	293	1,250
Other coarse and fine aggregates	507	4,000
Other construction materials	40	221
Agricultural:		
Limestone	982	6,220
Poultry grit and mineral food	W	W
Other agricultural uses	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Flux stone	W	W
Sulfur oxide removal	W	W
Special:		
Whiting or whiting substitute	W	W
Other fillers or extenders	W	W
Unspecified:[2]		
Reported	12,700	93,800
Estimated	5,920	38,200
Total	44,100	290,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
INDIANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	1,470	7,510
Coarse aggregate, graded[3]	3,510	29,200	1,820	16,900	3,630	22,200
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregates[5]	1,620	10,400	1,690	11,300	1,010	6,840
Other construction materials	22	119	10	59	8	45
Agricultural[6]	929	5,040	W	W	W	W
Chemical and metallurgical[7]	W	W	W	W	5,080	20,800
Special[8]	--	--	--	--	W	W
Unspecified:[9]						
Reported	2,740	23,300	3,950	32,100	5,990	38,400
Estimated	1,270	8,260	3,000	19,100	1,650	10,800
Total	11,300	84,900	11,300	84,500	21,600	121,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes stone sand (bituminous mix or seal), stone sand (concrete), screening (undesignated), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse fine aggregates.

[6]Includes limestone, poultry grit and mineral food, and other agricultural uses.

[7]Includes cement and lime manufacture, flux stone, and sulfur oxide removal.

[8]Includes whiting or whiting substitute and other fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

TABLE 5
INDIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,300	$18,100	$5.47
Plaster and gunite sands	1,960	6,810	3.48
Concrete products (blocks, bricks, pipe, decorative, etc.)	37	421	11.38
Asphaltic concrete aggregates and other bituminous mixtures	1,100	6,630	6.03
Road base and coverings[2]	601	4,080	6.78
Fill	1,420	7,510	5.30
Snow and ice control	243	965	3.97
Other miscellaneous uses[3]	18	141	7.83
Unspecified:[4]			
Reported	3,090	21,000	6.78
Estimated	7,070	34,400	4.86
Total or average	18,800	100,000	5.31

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes road and other stabilization (lime).

[3]Includes filtration and golf course.

[4]Reported and estimated production without a breakdown by end use.

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TABLE 6

INDIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	815	3,760	836	6,490	1,650	7,840
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	W	W	332	2,510	W	W
Asphaltic concrete aggregates and other bituminous mixtures	W	W	229	1,720	W	W
Road base and coverings[3]	229	1,600	289	1,950	83	525
Fill	364	1,460	959	5,600	93	452
Other miscellaneous uses[4]	512	3,390	192	843	2,090	6,500
Unspecified:[5]						
Reported	815	5,420	2,060	14,400	217	1,150
Estimated	2,320	11,400	2,780	14,100	1,970	8,900
Total	5,060	27,000	7,680	47,500	6,100	25,400

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes filtration, golf course, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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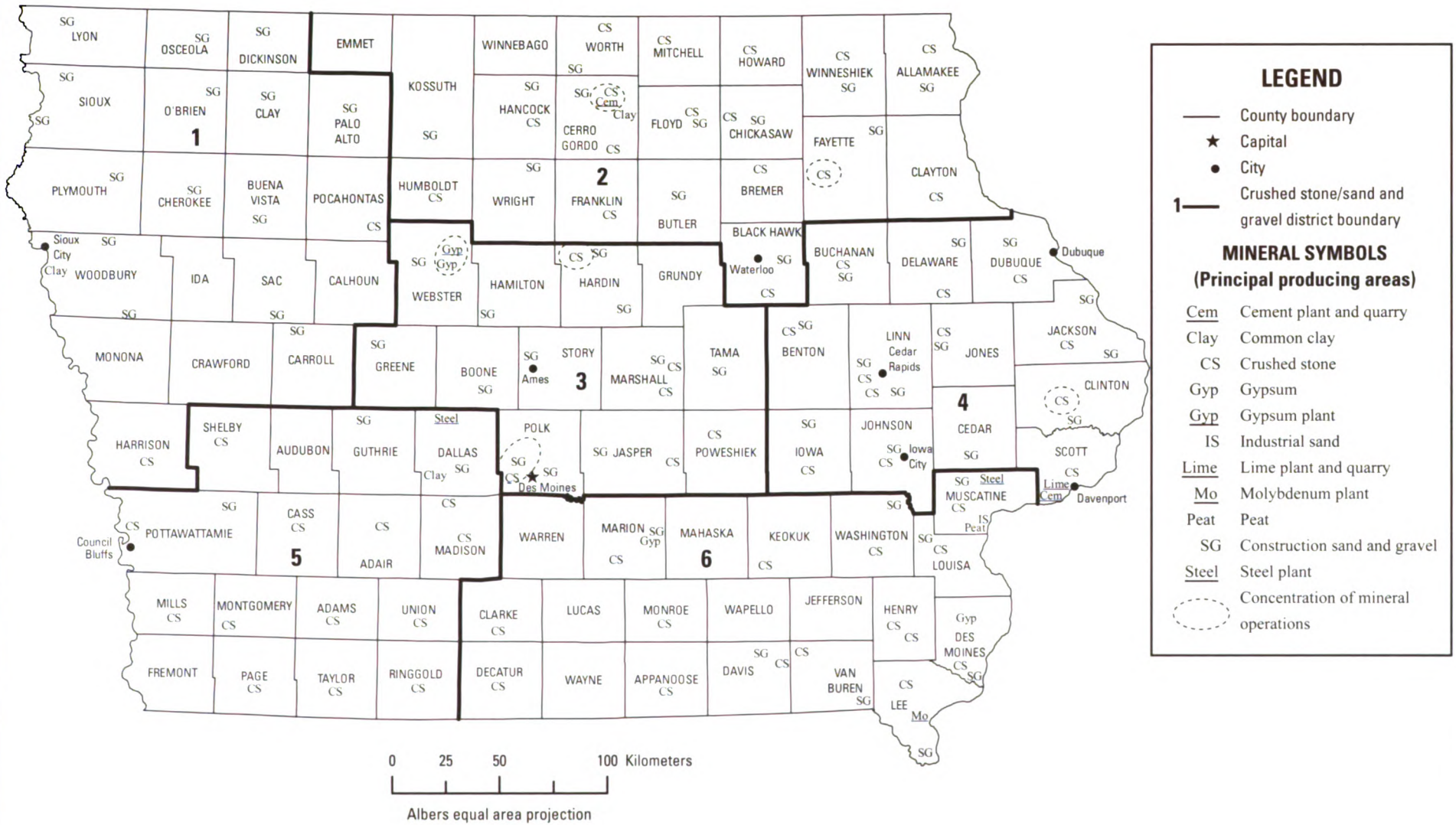

Source: Iowa Geological Survey and Land Quality Bureau/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF IOWA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Iowa Geological Survey and Land Quality Bureau for collecting information on all nonfuel minerals.

In 2009, Iowa's nonfuel raw mineral production[1] was valued at $596 million, based upon annual U.S. Geological Survey data. This was an $84 million, or 12%, decrease in the State's total nonfuel mineral production value from that of 2008, which followed a $1 million, or less than 1%, decrease in 2007 from a total of $681 million in 2006. Although the State's total production value decreased, the State remained 31st in rank among the 50 States in total nonfuel mineral production value and accounted for 1% of the U.S. total.

Crushed stone, portland cement, construction sand and gravel, lime, and crude gypsum (in descending order of value) continued to be Iowa's leading nonfuel mineral commodities in 2009, accounting for more than 99% of the State's total nonfuel mineral production value. Excluding gemstones, which had no change in production value, the only two mineral commodities produced in Iowa in 2009 to increase in production value were crude gypsum and peat. Crude gypsum saw a $5.5 million, or 60%, increase in production value, while production rose by 530,000 metric tons, or 42%. Peat production (actual values withheld—company proprietary data) rose significantly over 2007–08 levels.

The largest decrease in production value took place with portland cement, down 28%, with production down almost 31% (actual values withheld—company proprietary data). Other significant decreases took place with crushed stone, lime, and construction sand and gravel. Crushed stone was down by $15 million, with production down from 38.7 million metric tons (Mt) in 2008 to 32.6 Mt in 2009, or almost 16%, reversing the 9% increase in production from 2007–08. Construction sand and gravel experienced a 3.5-Mt decline in production from 2007–09, or 20%, with production values decreasing by $6.5 million, or almost 7%, over the same time period.

Iowa continued to be ranked second among the 16 crude gypsum-producing States in 2009. The State continued to rank among the top 20 producing States for portland cement, lime, and crushed stone. No metals were mined in Iowa; the State's metal production, including molybdenum and steel, came from the processing of materials acquired from other domestic and foreign sources. Secondary molybdenum products were produced at a plant in Fort Madison, Lee County, by Climax Molybdenum Co. (a subsidiary of Freeport-McMoRan Copper & Gold Inc.). Steel and steel products were produced at a steel mill outside of Wilton, Muscatine County, by Gerdau Ameristeel Corp. (part of the Gerdau Corp.), and at a mill, also in Muscatine County, by Ipsco Steel Inc. The State had many foundries and recyclers of iron and steel scrap, the most being in Lee and Scott Counties.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN IOWA[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	331	2,630	269	1,140	184	828
Gemstones, natural	NA	3	NA	3	NA	3
Gypsum, crude	1,490	9,050	1,250	9,230	1,780	14,800
Sand and gravel, construction	17,100	94,100 r	15,800 r	89,500 r	13,600	87,600
Stone, crushed	35,500	286,000	38,700 r	312,000 r	32,600	297,000
Combined values of cement, lime, peat, sand and gravel (industrial)	XX	289,000 r	XX	268,000 r	XX	196,000
Total	XX	681,000 r	XX	680,000	XX	596,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
IOWA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	209 r	38,700 r	$312,000 r	214	32,600	$297,000
Miscellaneous stone	1	39	202	2	37	270
Total	XX	38,700 r	312,000 r	XX	32,600	297,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
IOWA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	277	3,840
Riprap and jetty stone	360	6,660
Filter stone	49	695
Other coarse aggregate	254	2,400
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,010	12,500
Bituminous aggregate, coarse	300	3,780
Bituminous surface-treatment aggregate	126	1,540
Railroad ballast	W	W
Other graded coarse aggregate	52	591
Fine aggregate (-⅜ inch):		
Stone sand, concrete	93	908
Stone sand, bituminous mix or seal	216	2,900
Screening, undesignated	206	876
Other fine aggregate	55	571
Coarse and fine aggregates:		
Graded road base or subbase	3,600	35,600
Unpaved road surfacing	2,680	23,700
Crusher run or fill or waste	75	2,090
Roofing granules	W	W
Other coarse and fine aggregates	575	3,320
Other construction materials	226	3,040
Agricultural, limestone	W	W
Chemical and metallurgical:		
Cement manufacture	2,050	4,300
Lime manufacture	W	W
Flux stone	W	W
Glass manufacture	W	W
Special, asphalt fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	29	114
Unspecified:[2]		
Reported	11,200	107,000
Estimated	7,500	67,700
Total	32,600	297,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

IOWA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W	80	615
Coarse aggregate, graded[3]	--	--	W	W	W	W	232	2,420
Fine aggregate (-⅜ inch)[4]	--	--	W	W	W	W	W	W
Coarse and fine aggregate[5]	W	W	1,870	17,300	W	W	W	W
Other construction materials	--	--	152	1,510	--	--	73	1,540
Agricultural[6]	4	29	74	495	W	W	44	255
Chemical and metallurgical[7]	--	--	W	W	--	--	W	W
Special[8]	--	--	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	--	--	29	114
Unspecified:[9]								
Reported	378	3,670	1,670	16,200	4,170	40,300	2,670	24,800
Estimated	--	--	3,320	28,900	402	5,180	2,110	18,500
Total	564	5,960	9,030	79,200	5,630	56,300	8,380	68,000

Use	District 5		District 6		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	300	4,900	204	2,580	9	168
Coarse aggregate, graded[3]	243	3,380	W	W	29	356
Fine aggregate (-⅜ inch)[4]	157	2,020	W	W	48	196
Coarse and fine aggregate[5]	W	W	1,750	15,900	302	1,740
Other construction materials	--	--	--	--	--	--
Agricultural[6]	W	W	120	707	11	80
Chemical and metallurgical[7]	--	--	--	--	--	--
Special[8]	--	--	--	--	--	--
Other miscellaneous uses	--	--	--	--	--	--
Unspecified:[9]						
Reported	557	5,410	1,550	14,300	221	1,960
Estimated	587	5,210	1,080	9,840	--	--
Total	3,480	38,000	4,870	45,200	620	4,500

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3] Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement, lime, and glass manufacture, and flux stone.

[8]Includes asphalt fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

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TABLE 5
IOWA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,770	$11,800	$6.69
Plaster and gunite sands	107	711	6.64
Concrete products (blocks, bricks, pipe, decorative, etc.)	58	829	14.29
Asphaltic concrete aggregates and other bituminous mixtures	209	1,090	5.20
Road base and coverings[2]	1,680	6,590	3.92
Fill	587	2,390	4.07
Roofing granules	34	194	5.71
Snow and ice control	36	367	10.19
Other miscellaneous uses[3]	324	5,720	17.67
Unspecified:[4]			
Reported	5,740	39,200	6.83
Estimated	3,060	18,700	6.12
Total or average	13,600	87,600	6.44

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (lime).
[3]Includes railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

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TABLE 6

IOWA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	479	2,970	305	1,780	167	1,120
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	W	W	W	W	2	22
Asphaltic concrete aggregates and and road base materials[3]	828	2,940	481	1,850	W	W
Fill	181	562	116	625	94	443
Other miscellaneous uses[4]	14	68	384	6,060	300	1,300
Unspecified:[5]						
Reported	1,170	7,740	320	2,060	3,740	25,700
Estimated	1,230	6,860	559	3,600	59	377
Total	3,910	21,100	2,170	16,000	4,360	28,900

	District 4		District 5		District 6	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	277	2,060	--	--	542	3,910
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	W	W	--	--	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	(6)	(6)	183	1,030
Fill	97	391	--	--	98	371
Other miscellaneous uses[4]	143	1,550	--	--	187	1,050
Unspecified:[5]						
Reported	154	1,170	(6)	(6)	(6)	(6)
Estimated	418	2,780	(6)	(6)	(6)	(6)
Total	1,090	7,950	223	1,390	1,770	11,700

	Unspecified districts	
Use	Quantity	Value
Concrete aggregate (including concrete sand)	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	--	--
Asphaltic concrete aggregates and and road base materials[3]	84	511
Fill	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	--	--
Estimated	--	--
Total	84	511

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes railroad ballast, roofing granules, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

[6]Withheld to avoid disclosing company proprietary data; included in "Total."

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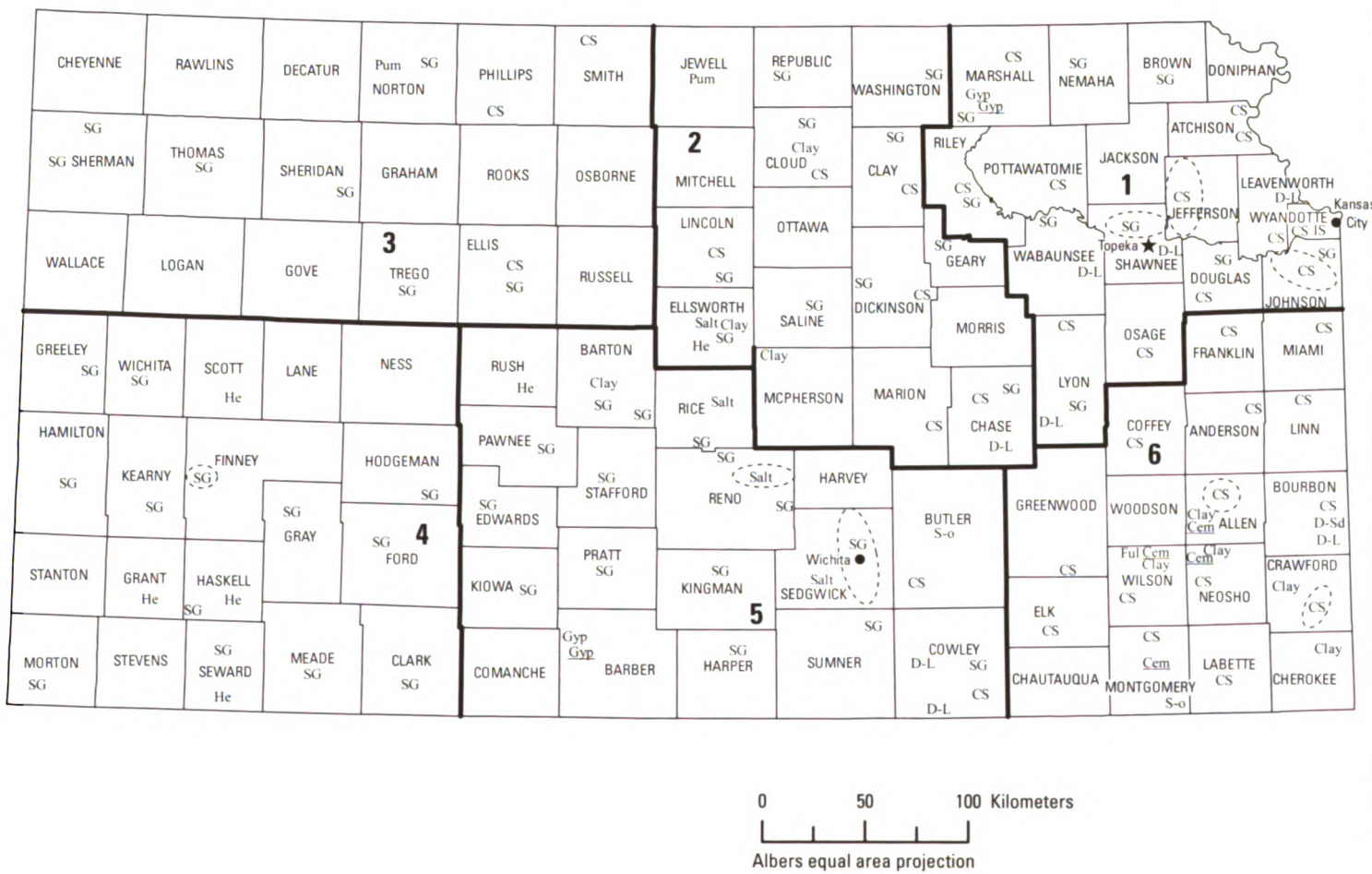

LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-L	Dimension limestone
D-Sd	Dimension sandstone
Ful	Fuller's earth
Gyp	Gypsum
Gyp	Gypsum plant
He	Helium
IS	Industrial sand
Pum	Pumice and pumicite
S-o	Sulfur (oil)
Salt	Salt
SG	Construction sand and gravel

Concentration of mineral operations

Source: Kansas Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF KANSAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Kansas Geological Survey for collecting information on all nonfuel minerals.

In 2009, Kansas' nonfuel raw mineral production[1] was valued at $953 million, based upon annual U.S. Geological Survey (USGS) data. This represented a $169 million, or 15%, decrease from the State's total nonfuel mineral production value of 2008, which followed a $48 million, or 4.5%, increase from 2007 to 2008. The State rose to 20th from 22d in rank among the 50 States in total nonfuel mineral production value, of which Kansas accounted for more than 1.6% of the U.S. total. Per capita, the State ranked 10th in the Nation based on its nonfuel mineral industry production value; with a population of just over 2.8 million, the production value was about $338 per capita.

Grade-A helium, salt, portland cement, and crushed stone were Kansas' leading nonfuel mineral commodities in 2009, accounting for about 35%, 20%, 18%, and 15%, respectively, of the State's total nonfuel mineral production value. These four mineral commodities collectively accounted for 87% of the State's total production value. The only increases in nonfuel mineral commodity production value took place in salt (up by $10 million) and dimension stone (up by $2 million). Dimension stone production in Kansas increased by 45%, up to 29,000 metric tons (t) in 2009 from 20,000 t in 2008, whereas salt production was down 10% to 2.7 million metric tons (Mt) in 2009 from 3 Mt in 2008 (table 1). Kansas was one of six States that showed an increase in the production value of dimension stone, out of 37 producing States.

The largest decreases in Kansas' mineral commodity production values took place in portland cement (down by $76 million), Grade-A helium (down by $51 million), crushed stone (down by $37 million), and construction sand and gravel (down by $8.3 million) (table 1). Crude gypsum, industrial sand and gravel, and masonry cement showed significant decreases in value; common clays showed moderate decreases in value; and the value of crude helium and pumice and pumicite decreased slightly (data withheld-company proprietary data) (table 1). Most of these industrial minerals are widely used in the construction industry and were affected by the ongoing economic downturn.

Kansas continued to be the leading producer of both crude and Grade-A helium. Kansas remained 5th of 16 producing States in the quantity of salt produced, and 7th of 7 States in the quantity of pumice and pumicite produced. The State rose in rank from 12th to 9th (of 16 producing States) in the quantity of crude gypsum produced, from 13th to 12th (of 36 producing States) in the quantity of portland cement produced, and from 22d to 15th (of 37 producing States) in the quantity of dimension stone produced. Kansas dropped to 13th from 12th (of 38 producing States) in the quantity of common clays produced, and from 21st to 23d (of 50 producing States) in the quantity of crushed stone produced. Production of nonfuel minerals in Kansas in 2009 consisted entirely of industrial minerals, as it has since 1970, following nearly a century of metal production that began in 1877.

The following narrative information was provided by the Kansas Geological Society (KGS).[2]

Employment, Mining Activities, and Reclamation Awards

During 2009, the mining industry totaled 1,076 employees, with an average annual salary of about $41,900. This represented a decrease of 10.3% in total number of mining employees, with a less-than-1% increase in average annual salary, with an approximately 10% decrease in the total number of mineral industry employees from that of 2008. Data concerning employment in the Kansas mineral industry was obtained by the Labor Market Information Services of the Kansas Department of Labor (Kansas Department of Labor, 2013).

A total of 1,149 mining sites for nonfuel mineral commodities operated in Kansas in 2009. The private sector had 141 companies operating at 492 sites and 59 county government agencies operating at 657 sites. This represented an increase from 2008 of 4 private sector operators and 13 mining sites. County government agencies experienced no change in the number of mining operations or locations from 2008 to 2009. There were approximately 590 hectares (ha) mined and 260 ha reclaimed during 2009. A total of about 2,240 ha of mined land have been reclaimed and released from regulatory review since the State nonfuel mining reclamation program began in July 1994 (S.B. Carlson, Assistant Director/Land Reclamation Program Manager, Kansas Conservation Commission, written commun., July 16, 2010).

The Kansas Governor's Mined Land Reclamation Award for 2009 was presented to two recipients. The Kansas Department of Wildlife and Parks received the award for reclaiming a 17-ha abandoned limestone quarry near Melvern Lake Area in Osage County. The reclaimed area was converted into both a youth/mentor fishing and hunting area and an area for the benefit of wildlife and public recreation. Cornejo Materials, Inc., received the award for reclaiming a 37-ha sand operation located in northwest Wichita. The 24-ha lake resulting from sand removal was contoured to allow for future housing development (Kansas State Conservation Commission, 2010, p. 6).

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2] Daniel R. Suchy, Geologist of the Data Resources Library of the Kansas Geological Survey, in consultation with Dr. Dennis Baker of the State Conservation Commission, authored the text of the State's mineral industry information provided by that agency.

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Legislation and Government Activities

No significant legislation concerning the nonfuel mineral industry passed the Kansas legislature during the 2009 session. The 2009 Kansas Geological Survey Field Conference was organized and led primarily by members of the KGS and cosponsored with several other State agencies. The field trip centered around environmental and natural resource issues in southwestern Kansas, an area rich in natural resources such as the Hugoton Natural Gas Field and the Ogallala aquifer. The purpose of this field conference was to inform Kansas legislators and State government officials of the effects of climate change, and covered topics such as road construction projects and water-quality, land-rights, and material-supply issues. Stops included the Abengoa Bioenergy Corp.'s hybrid refinery (a cellulosic-ethanol plant), the U.S. Department of Agriculture's Cimarron National Grassland; Sunflower Electric Power Corp.'s Holcomb Station coal-fired power plant; enXco, Inc.'s Spearville Wind Farm; and the Winger Archeological Site. Information on the field conference, including background material, is available from the KGS (Lyle and others, 2009).

The KGS continued a major geologic mapping program supported in part by the STATEMAP program of the National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. Geologic mapping in 2009 was conducted in Harvey, McPherson, Morris, and Reno Counties. Additional geologic mapping in the EDMAP program of the NCGMP was conducted in Finney, Hamilton, and Kearny Counties by the University of Kansas in cooperation with the KGS. A new geologic map of Ford County (Johnson and Woodward, 2009) was published by the KGS. Several additional county geologic maps for which field geologic mapping had been completed were in various stages of preparation and review during the year.

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN KANSAS[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland		2,760	282,000 e	2,400	246,000 e	1,670	170,000 e
Clays, common		563	3,830	548	2,840	381	2,430
Gemstones, natural		NA	1	NA	1	NA	1
Helium, Grade-A	million cubic meters	88	316,000	79	384,000	68	332,000
Salt		2,870	158,000	3,010	178,000	2,710	188,000
Sand and gravel, construction		11,200 r	52,100 r	10,500 r	51,600 r	8,580	43,300
Stone:							
Crushed		23,400	199,000	23,100 r	180,000	17,200	143,000
Dimension		14	1,990	20	2,560	29	4,650
Combined values of cement (masonry), clays (fuller's earth), gypsum (crude), helium (crude), pumice and pumicite, sand and gravel (industrial)		XX	62,200 r	XX	77,500 r	XX	69,200
Total		XX	1,070,000 r	XX	1,120,000	XX	953,000

eEstimated. rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

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TABLE 2
KANSAS: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	128 r	21,700	$171,000	97	16,900	$141,000
Miscellaneous stone	3	1,370	8,620	3	291	2,570
Total	XX	23,100 r	180,000	XX	17,200	143,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
KANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	54	678
Other coarse aggregate	39	462
Coarse aggregate, graded:		
Concrete aggregate, coarse	307	3,050
Bituminous aggregate, coarse	W	W
Other graded coarse aggregate	868	8,630
Fine aggregate (-⅜ inch):		
Screening, undesignated	517	2,420
Other fine aggregate	65	588
Coarse and fine aggregates:		
Graded road base or subbase	1,070	8,020
Unpaved road surfacing	348	1,220
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	550	5,430
Other construction materials	58	333
Agricultural:		
Limestone	W	W
Other agricultural uses	W	W
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]		
Reported	4,190	36,500
Estimated	8,220	68,000
Total	17,200	143,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
KANSAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[3]	W	W	--	--	W	W
Coarse aggregate, graded[4]	W	W	--	--	W	W
Fine aggregate (-⅜ inch)[5]	W	W	W	W	--	--
Coarse and fine aggregate[6]	W	W	W	W	W	W
Other construction materials	34	114	--	--	--	--
Agricultural[7]	W	W	--	--	W	W
Chemical and metallurgical[8]	--	--	--	--	--	--
Unspecified:[9]						
Reported	825	7,230	681	5,810	--	--
Estimated	3,080	25,600	244	2,030	--	--
Total	5,740	49,400	1,540	12,000	80	579

	District 5		District 6	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[3]	--	--	W	W
Coarse aggregate, graded[4]	--	--	W	W
Fine aggregate (-⅜ inch)[5]	--	--	W	W
Coarse and fine aggregate[6]	--	--	933	5,930
Other construction materials	--	--	24	220
Agricultural[7]	--	--	W	W
Chemical and metallurgical[8]	--	--	W	W
Unspecified:[9]				
Reported	847	7,600	1,840	15,900
Estimated	1,480	12,300	3,410	28,100
Total	2,330	19,900	7,510	61,500

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]No production for District 4.

[3]Includes riprap and jetty stone and other coarse aggregate.

[4]Includes concrete aggregate (coarse), bituminous aggregate (coarse), and other graded coarse aggregate.

[5]Includes screening (undesignated) and other fine aggregate.

[6]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[7]Includes limestone and other agricultural uses.

[8]Includes cement manufacture.

[9]Reported and estimated production without a breakdown by end use.

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TABLE 5
KANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	849	$4,110	$4.84
Plaster and gunite sands	29	214	7.38
Concrete products (blocks, bricks, pipe, decorative, etc.)	58	671	11.57
Asphaltic concrete aggregates and other bituminous mixtures	246	1,570	6.39
Road base and coverings[2]	1,630	7,890	4.85
Fill	772	2,490	3.23
Snow and ice control	31	163	5.26
Other miscellaneous uses[3]	116	810	6.98
Unspecified:[4]			
Reported	644	3,090	4.80
Estimated	4,200	22,200	5.29
Total or average	8,580	43,300	5.05

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (cement and lime).
[3]Includes filtration, golf course, and railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

TABLE 6
KANSAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	W	W	W	W
Asphaltic concrete aggregates and and road base materials[3]	W	W	436	3,150	W	W
Fill	87	366	116	630	2	5
Other miscellaneous uses[4]	172	1,090	118	895	213	649
Unspecified:[5]						
Reported	324	1,700	124	696	21	110
Estimated	2,390	12,300	218	1,180	137	741
Total	2,970	15,500	1,010	6,550	373	1,510
	District 4		District 5[6]		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	200	1,510	523	2,390	--	--
Asphaltic concrete aggregates and and road base materials[3]	679	3,030	533	2,410	--	--
Fill	113	216	455	1,280	--	--
Other miscellaneous uses[4]	5	17	78	290	--	--
Unspecified:[5]						
Reported	107	239	65	328	4	20
Estimated	492	2,650	970	5,360	--	--
Total	1,600	7,670	2,620	12,100	4	20

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement and lime).
[4]Includes filtration, golf course, railroad ballast, and snow and ice control.
[5]Reported and estimated production without a breakdown by end use.
[6]No production for District 6.

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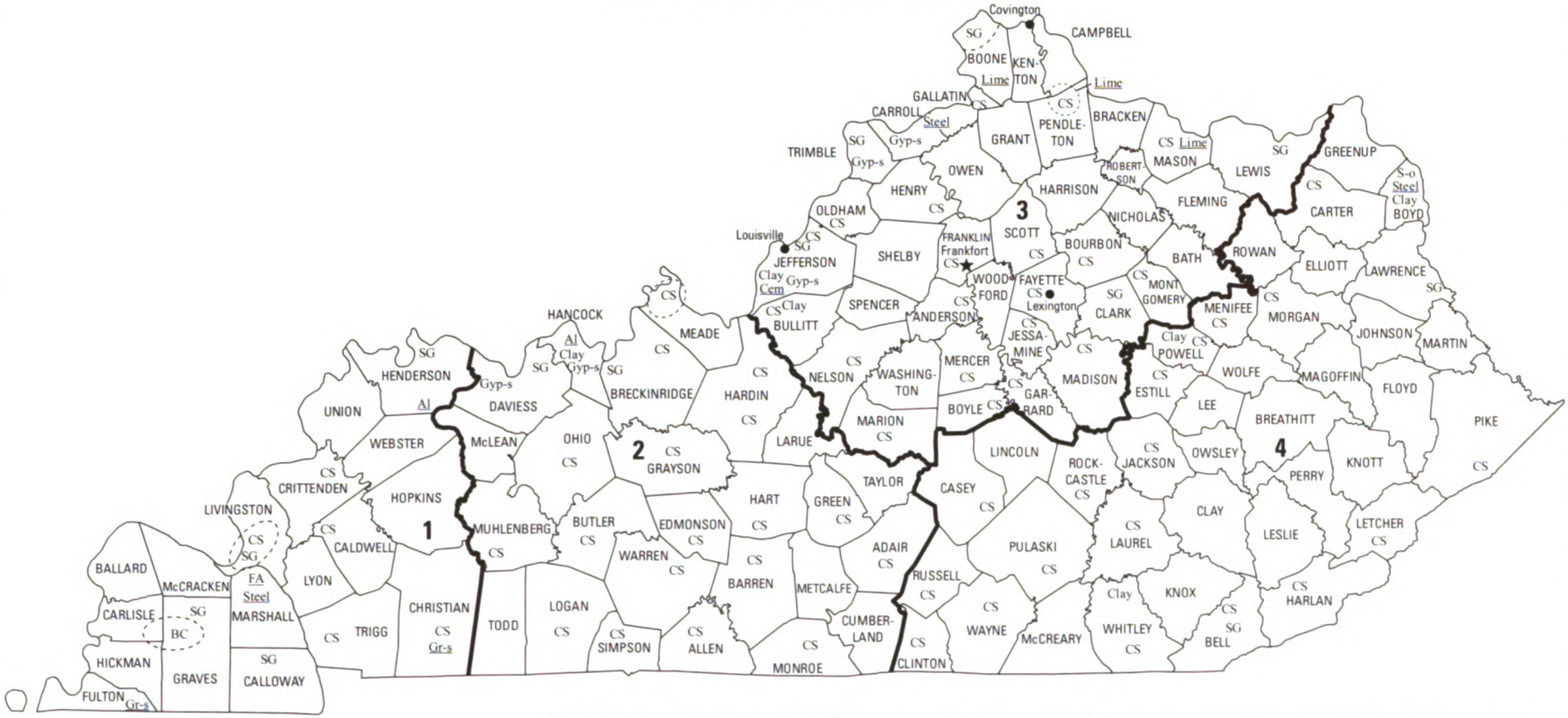
KENTUCKY



Source: Kentucky Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF KENTUCKY

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Kentucky Geological Survey for collecting information on all nonfuel minerals.

In 2009, Kentucky's nonfuel raw mineral production[1] was valued at $668 million, based upon annual U.S. Geological Survey (USGS) data. This was a $128 million, or 16%, decrease from the State's total nonfuel mineral production value of $796 million in 2008, which followed a $5 million, or less-than-1%, increase in the State's total production value of $791 million in 2007. Kentucky was 27th, up from 28th in 2008, in rank among the 50 States in total nonfuel mineral production value, accounting for slightly more than 1% of the U.S. total.

In 2009, crushed stone continued to be Kentucky's leading nonfuel mineral commodity by production value, accounting for 58% of the State's total nonfuel raw mineral production value, up from 53% in 2008. The State's second leading nonfuel mineral commodity was lime, followed by portland cement (production and production values withheld for both mineral commodities—company proprietary data), and construction sand and gravel.

All mineral commodities produced in the State decreased in both the quantities produced and production values in 2009. The production of crushed stone was down by 8.4 million metric tons (Mt) and down by $33 million in production value. Smaller, yet significant, decreases also took place in the production of construction sand and gravel, down by 360,000 t, or almost 5%, from that of 2008, and common clays, down by 131,000 metric tons (t), or 31%. Production values for construction sand and gravel and common clays were down $1.9 million, or 5%, and almost $2.2 million, or 27%, respectively, from those of 2008.

In 2009, Kentucky continued to rank 3d in the quantities of lime produced, 4th out of the five ball-clay-producing States, and 19th in common clay production. The State rose significantly in rank from 12th to 7th in the production of crushed stone, accounting for 4% of the total quantity of the almost 1.2 billion metric tons produced in the United States in 2009, and accounting for 3.4% of the total value of $11.3 billion. The State declined in rank from 19th to 21st out of the 36 portland cement-producing States. Additionally, primary aluminum and raw steel were produced from materials obtained from other domestic and foreign sources. Kentucky remained the Nation's leading producer of primary aluminum, producing approximately 36% more primary aluminum than the second leading producer, Indiana (actual values withheld—company proprietary data).

Notable aluminum facilities in the State included Logan Aluminum Inc.'s rolling mill and secondary smelter near Russelville, Logan County; Aleris International Inc.'s rolling mill in Lewisport, Hancock County; Century Aluminum Co.'s primary smelter in Hawesville, Hancock County; and Rio Tinto Alcan's primary smelter in Henderson County, near Sebree in Webster County (Kentucky Cabinet for Economic Development, 2009a, p. 4).

Notable steel-related facilities in the State included North American Stainless, in Ghent, Carroll County; AK Steel Corp., in Ashland, Boyd County; Mubea Inc., Boone County; and, Gallatin Steel Co., in Ghent, Gallatin County (Kentucky Cabinet for Economic Development, 2009b, p. 5).

The following narrative information was provided by the Kentucky Geological Survey[2] (KGS).

Overview

The development of the mineral industry in the State slowed during 2009 as a result of the overall economic slowdown and diminished demand for mineral commodities in the global, national, and local economies, and also in the residential, industrial, and transportation markets. Declines in demand for crushed stone, construction sand and gravel, steel, clay, coal, and declining prices in aluminum caused many mining and associated companies to curtail production, reduce staff, or reduce work hours in order to be cost efficient.

However, even with the economic slowdown, Kentucky continued to be the leading State in the production of primary aluminum and underground limestone in 2009. Synthetic graphite, natural gemstones, and freshwater pearls continued to be produced in several Kentucky counties.

Exploration and Mine Development Activities

Fluorspar.—In 2009, Hastie Mining and Trucking Co. (Cave-In-Rock, IL) continued to develop the Klondike II Mine project in the Western Kentucky fluorspar district and to obtain the necessary permits to open a fluorspar mine. Construction of a tailings pond was completed. Core drilling results from the mine in Livingston County showed that several cores contained a high percentage of fluorspar (Miller, 2011, p. 26.1).

Stone, Crushed.—Hilltop-Ingleside Mine LLC (Cincinnati, OH) continued work to open an underground limestone mine on the property owned by East Kentucky Power Cooperative (EKPC) in Mason County. Plans were announced in September 2008, with Hilltop expecting operations to begin in 2010 to supply approximately 900,000 t (1 million short tons) of desulfurization stone to EKPC's coal-fired powerplants at Spurlock Station, near Maysville, Mason County, on the Ohio-Kentucky border (Toncray, 2010).

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Warren H. Anderson, Geologist and Principal Investigator with the Kentucky Geological Survey, submitted the text of the State mineral industry information provided by that State agency.

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Commodity Review

Industrial Minerals

Stone, Crushed.—In June, North American Limestone Corp. (Louisville, KY) announced the final approval of mining permits from the State of Kentucky to open a new quarry in Todd County, near the Fort Campbell Military Base, near the Kentucky-Tennessee border. The company estimated the site to contain at least 50 years of high-quality reserves (North American Limestone Corp., 2009). Carmeuse Lime and Stone furloughed 34 hourly workers at its Black River facility in Pendleton County owing to declining demand for its limestone products, particularly in the construction and steel industries (Goldman, 2009).

Summit Materials LLC (Washington, DC) announced the acquisition of Hinkle Contracting Corp., based in Paris, Bourbon County, early in 2010, after pursuing the acquisition during the last months of 2009. Summit Materials was formed in 2009 to grow business in the construction aggregates and heavy building materials industries through strategic acquisitions (Summit Materials LLC, 2009). Hinkle was a major aggregates producer in the northeastern portion of the State. The company was reported to have more than 227 Mt of limestone reserves and its operations included 12 aggregate and 17 asphalt facilities (Summit Materials LLC, 2010).

Metals

Aluminum.—In March 2009, Century Aluminum of Kentucky (a wholly owned subsidiary of Century Aluminum Co. of Monterey, CA) closed one of its five potlines at the Hawesville aluminum smelter as part of an effort to contain costs owing to the decline in aluminum prices since July 2008. The smelter capacity was 250,000 t of primary aluminum annually and the closure of one line was anticipated to reduce production by 4,400 metric tons per month and affect 120 employees (Century Aluminum Co., 2009).

In late November 2009, Electro Cycle Inc. announced plans to invest $2 million at its aluminum recycling plant in Madisonville, where the company processes new production scrap aluminum to produce recycled scrap ingot. Enhancements and upgrades included building an additional furnace, upgrading shredders and conveyor systems, and adding state-of-the-art electronic controls. The company anticipated the preservation of 40 employee jobs (Wiles, 2009).

Government Programs and Activities

The Kentucky Geological Survey's rocks and minerals Web site (http://www.uky.edu/KGS/rocksmn/index.htm) provides introductory information on the mineral resources of the State. KGS continued to work on a long-term project of maintaining a minerals GIS database to allow the user to search specific information on mineral deposits. Information on minerals deposits such as mine maps, cross sections, ore-grade analysis, and log data continued to be scanned and were incorporated into the database. The database can be searched using a specific site location to provide detailed information to the user.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN KENTUCKY[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	598	3,720	419	8,170	288	5,980
Gemstones, natural	NA	48	NA	173	NA	37
Sand and gravel, construction	9,070	48,300	7,620 r	41,700 r	7,260	39,800
Stone, crushed	56,000	432,000	52,700 r	422,000 r	44,300	389,000
Combined values of cement, clays (ball), lime	XX	307,000	XX	324,000 r	XX	233,000
Total	XX	791,000	XX	796,000 r	XX	668,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

TABLE 2
KENTUCKY: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008r			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	97	52,700 r	$422,000 r	88	44,300	$389,000

rRevised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
KENTUCKY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	829	9,930
Filter stone	232	1,790
Other coarse aggregate	814	8,000
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,510	12,600
Bituminous aggregate, coarse	478	4,250
Bituminous surface-treatment aggregate	298	2,580
Railroad ballast	275	1,970
Other graded coarse aggregate	6,620	64,000
Fine aggregate (-⅜ inch):		
Stone sand, concrete	119	943
Stone sand, bituminous mix or seal	194	1,760
Screening, undesignated	1,630	13,800
Other fine aggregate	749	7,600
Coarse and fine aggregates:		
Graded road base or subbase	1,780	13,400
Unpaved road surfacing	374	3,060
Crusher run or fill or waste	243	2,010
Other coarse and fine aggregates	2,130	18,900
Other construction materials	53	435
Agriculture, limestone	354	2,240
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Flux stone	W	W
Chemical stone	W	W
Sulfur oxide removal	W	W
Special, other fillers or extenders	W	W
Unspecified:[2]		
Reported	8,350	74,800
Estimated	11,000	89,600
Total	44,300	389,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

KENTUCKY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	268	2,210	W	W
Coarse aggregate, graded[3]	W	W	W	W	2,030	20,000	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W	394	3,710
Coarse and fine aggregate[5]	1,100	7,870	546	4,670	2,130	18,600	757	6,320
Other construction materials	--	--	--	--	--	--	53	435
Agricultural[6]	W	W	W	W	W	W	W	W
Chemical and metallurgical[7]	W	W	W	W	W	W	--	--
Special[8]	--	--	W	W	--	--	--	--
Unspecified:[9]								
Reported	2,200	18,500	651	5,850	3,650	34,600	1,840	15,900
Estimated	582	5,070	4,170	36,800	2,640	19,500	3,570	28,300
Total	10,400	93,000	8,120	72,600	16,700	147,000	9,080	76,600

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement and lime manufacture, chemical stone, flux stone, and sulfur oxide removal.

[8]Includes other fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

TABLE 5

KENTUCKY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,270	$5,830	$4.58
Asphaltic concrete aggregates and road base materials	164	803	4.90
Fill	125	493	3.94
Other miscellaneous uses	7	78	11.14
Unspecified:[2]			
Reported	576	4,490	7.79
Estimated	5,110	28,100	5.49
Total or average	7,260	39,800	5.48

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 6
KENTUCKY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	W	W	--	--	W	W
Asphaltic concrete aggregates and road base mater	--	--	W	W	W	W
Fill	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	W	W
Unspecified:[2]						
Reported	--	--	W	W	W	W
Estimated	W	W	288	1,370	3,840	22,100
Total	1,980	9,030	640	4,070	4,430	25,300

	District 4	
	Quantity	Value
Concrete aggregate (including concrete sand)	--	--
Asphaltic concrete aggregates and road base mater	--	--
Fill	W	W
Other miscellaneous uses	--	--
Unspecified:[2]		
Reported	W	W
Estimated	W	W
Total	198	1,410

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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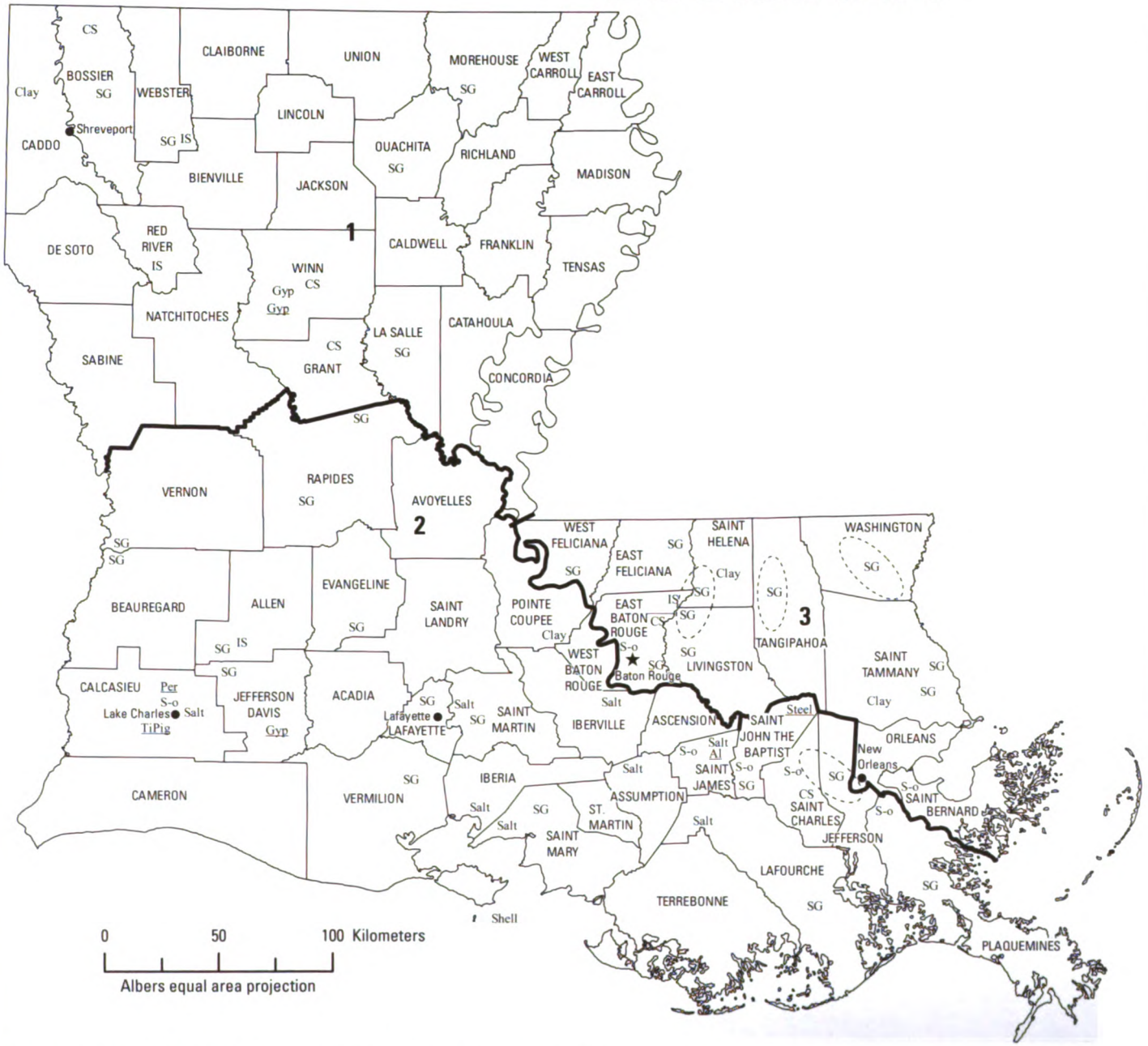
LOUISIANA



LEGEND

- Parish boundary
- ★ Capital
- ● City
- Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Al	Aluminum plant
Clay	Common clay
CS	Crushed stone
Gyp	Gypsum
Gyp	Gypsum plant
IS	Industrial sand
Per	Perlite plant
S-o	Sulfur (oil)
Salt	Salt
SG	Construction sand and gravel
Shell	Shell
Steel	Steel plant
TiPig	Titanium pigment plant
	Concentration of mineral operations

Source: Louisiana Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF LOUISIANA

In 2009, Louisiana's nonfuel raw mineral production[1] was valued at $568 million, based upon annual U.S. Geological Survey (USGS) data. This was a $53 million, or 8.5%, decrease from the State's total nonfuel mineral value of $620 million in 2008, which had increased by $59 million, or 11%, from a total of $561 million in 2007. Louisiana rose from 34th to 32d in rank among the 50 States in total nonfuel mineral production value and accounted for slightly less than 1% of the U.S. total.

Salt, with a production value of $229 million, remained the State's leading mineral commodity for the second consecutive year, accounting for 40% of the State's total nonfuel mineral value in 2009. Construction sand and gravel was the second leading mineral commodity in the State; with a production value of $205 million, it accounted for 36% of the State's total nonfuel mineral production value. In 2009, industrial sand and gravel was the only mineral commodity to increase in production value, up by $2.8 million, or 12%. The production value of gemstones remained the same from 2008 to 2009. All other nonfuel mineral commodities produced in the State declined in production value, including decreases in construction sand and gravel, down by $26 million, , common clay, down by $3.8 million, and salt, down by $2.1 million. Crushed stone[2] decreased by 19% in production value (actual data withheld—company proprietary data).

All nonfuel mineral commodities produced in the State decreased in production quantity in 2009. Both construction sand and gravel and salt decreased by about 10%. Significant decreases in production quantity also took place in common clay, down by 156,000 metric tons (t), or almost 31%, and industrial sand and gravel, down by 66,000 t, or 12%.

The State continued to lead the Nation in the production of salt among 16 producing States, accounting for 31% of the Nation's total of 43 million metric tons. The State remained 14th in the production of industrial sand and gravel among 34 producing States. Louisiana rose in rank to 14th from 16th in the production of construction sand and gravel. The State decreased in rank to 14th from 13th in the production of common clay and to 15th from 11th in the production of crude gypsum.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at http://minerals.usgs.gov/minerals.

[2]In 2009, 92% of the crushed stone sold or used in the State was imported from foreign and domestic sources. State and district tables were discontinued in 2005 in order not to disclose company proprietary data.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN LOUISIANA[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	552	13,800	509	12,900	353	9,120
Gemstones, natural	NA	7	NA	7	NA	7
Salt	13,900	180,000	14,600	231,000	13,200	229,000
Sand and gravel:						
Construction	26,200 r	240,000 r	22,900 r	231,000 r	20,600	205,000
Industrial	635	21,200	748	23,100	682	25,900
Combined values of gypsum (crude), lime, stone (crushed limestone and sandstone)	XX	106,000 r	XX	123,000 r	XX	99,500
Total	XX	561,000 r	XX	620,000 r	XX	568,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

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TABLE 2
LOUISIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)[2]	3,470	$32,100	$9.26
Asphaltic concrete aggregates and road base and coverings[3]	1,050	22,700	21.62
Fill	1,410	4,050	2.88
Other miscellaneous uses[4]	59	646	10.95
Unspecified:[5]			
Reported	2,550	21,900	8.61
Estimated	12,100	123,000	10.18
Total or average	20,600	205,000	9.92

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement).
[4]Includes railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

TABLE 3
LOUISIANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	W	W	W	W	2,080	17,000
Asphaltic concrete aggregates and and road base materials[3]	--	--	W	W	W	W
Fill	W	W	W	W	157	488
Other miscellaneous uses[4]	--	--	W	W	W	W
Unspecified:[5]						
Reported	W	W	214	1,600	W	W
Estimated	253	2,510	3,900	39,900	7,950	81,800
Total	904	9,970	7,030	70,300	12,200	120,000

	Unspecified districts	
Use	Quantity	Value
Concrete aggregate (including concrete sand)[2]	--	--
Asphaltic concrete aggregates and and road base materials[3]	--	--
Fill	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	539	4,760
Estimated	--	--
Total	539	4,760

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement).
[4]Includes railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

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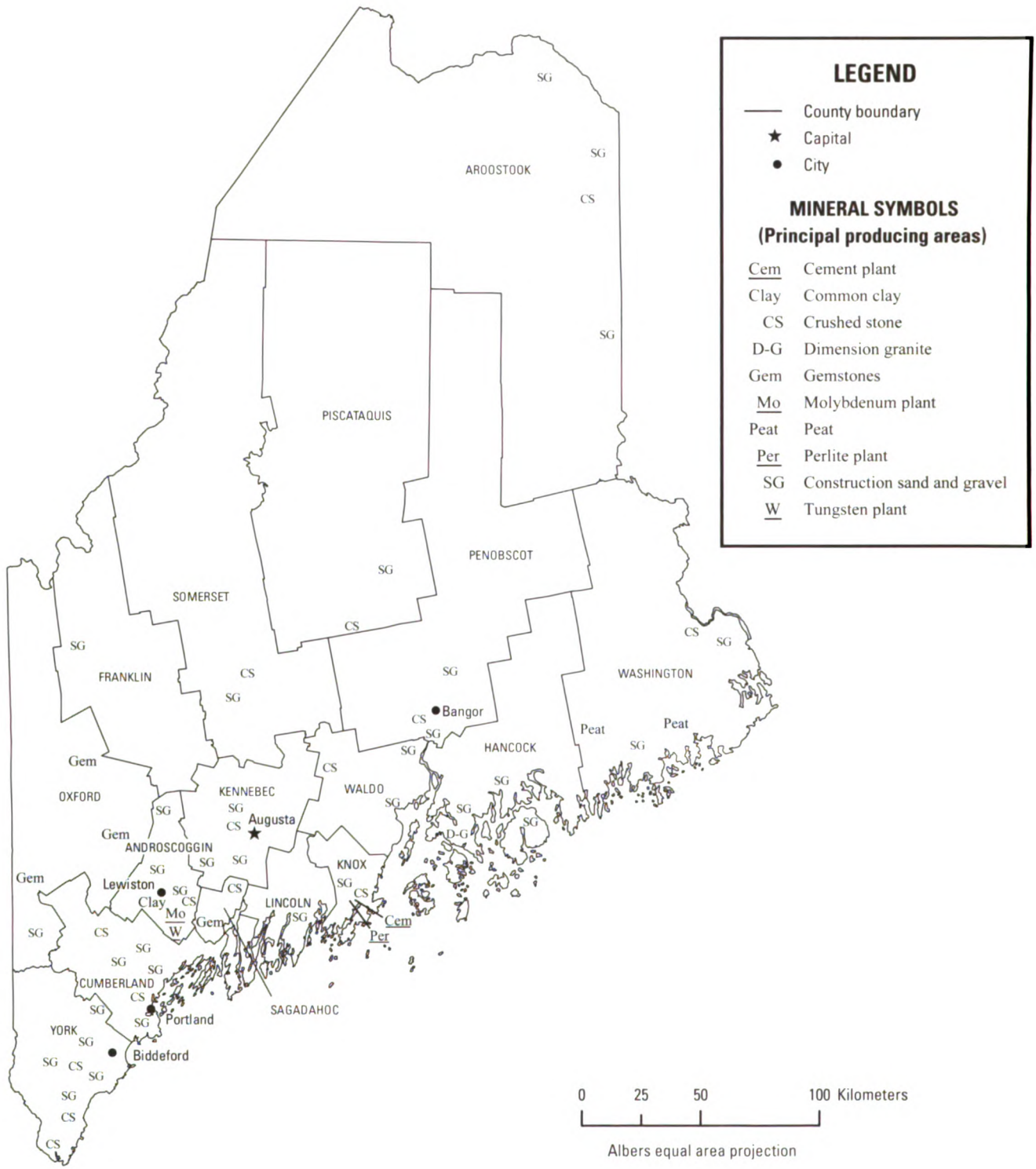
MAINE



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THE MINERAL INDUSTRY OF MAINE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Maine Geological Survey for collecting information on all nonfuel minerals.

In 2009, Maine's nonfuel raw mineral production[1] was valued at $125 million, based upon annual U.S. Geological Survey data. This was a $36 million, or 22%, decrease from the State's total production value in 2008, $161 million, which was down $18 million, or 10%, from a total of $179 million in 2007. The State remained 44th in rank among the 50 States for total nonfuel mineral production value and accounted for less than one-quarter of 1% of the U.S. total.

The majority of the State's nonfuel mineral production resulted from the mining and production of construction minerals and materials—construction sand and gravel, crushed stone, portland cement, and dimension stone, in descending order of total production value. Construction sand and gravel and crushed stone accounted for almost 73% of Maine's total nonfuel raw mineral production value in 2009, up from 64% in 2008, which in turn was down from 69% in 2007. Both mineral commodities saw decreases in quantities produced and total production value. Combined, production decreased by 1.47 million metric tons (Mt) in 2009 compared with that of 2008 and with a decrease in production value of $12 million. In 2008, production of both of these mineral commodities had decreased by almost 1.8 Mt compared with that of 2007, with a decrease in value of $20.6 million. In 2009, construction sand and gravel saw a greater decline in production value, 14%, than crushed stone, down almost 7%. The production value of dimension stone produced was down 24% from that of 2008 (table 1).

In 2009, Maine remained fourth in the quantity of peat produced. One company in Lewiston, in southern Maine, continued to produce molybdenum and tungsten products from raw materials originating from outside of the State. The Maine Geological Survey[2] provided the narrative information that follows.

Exploration

Metals

During 2009, a private party from Toronto, Ontario, Canada, continued its lease of a claim staked in 2006 from the State for mineral rights beneath Alder Pond in Somerset County, in west-central Maine. In 2006, following more than 7 years of exploration work, International Paper Co. had allowed its claim on the 42-hectare (105-acre) Alder Pond prospect in Somerset County, northwestern Maine, to lapse. Discovered in 1985, the Alder Pond copper-lead-zinc-silver sulfide deposit extends beneath the property and was estimated to hold about 3.1 Mt of resources.

Following an airborne geophysical survey and extensive drilling in 2007, Golden Hope Mines Ltd. (Toronto, Ontario, Canada) sold its interest in 2009 in the Big Hill deposit, in Pembroke, in the eastern portion of the State. The company cited insufficient mineralization for the deposit to be economic. The Big Hill deposit had been known since the 1960s and 1970s when a drilling program identified several high-grade silver intercepts. The copper-lead-zinc-silver mineralization was hosted in the mixed volcanic rocks of the Silurian Leighton Formation, which included rhyolitic and dacitic lapilli tuffs and basalt flows.

Golden Hope relinquished a lease in 2009 for a public lot in township T12 R8, Aroostook County, after surface exploration revealed little in terms of targets for further exploration. This is the same township that hosts the Bald Mountain copper-zinc-gold-silver massive sulfide deposit in Ordovician volcanic rocks.

Commodity Review

Industrial Mineral

Gemstones.—During 2009, Coromoto Minerals continued mining at the Mount Mica Mine, which in total amounted to hundreds of meters of underground workings. Numerous gem pockets were opened during this effort, yielding many gem-quality tourmaline specimens, including many deep-green specimens with ruby-red terminations. This famous pegmatite deposit was discovered in 1820 and has been worked intermittently ever since. Other pegmatite minerals are also recovered during the mining operation, such as quartz crystals, lapidary-grade masses of purple lepidolite mica, and occasionally beryl crystals.

Other pegmatite deposits worked for gemstock and mineral specimens in 2009 included the Colton Hill amethyst mine in Stow, the Russell Brothers quarry in Topsham, which was worked for beryl, and the Newry Mines in Newry, which included the first pockets of blue gem-like tourmaline. Production from these and other Maine pegmatites was generally small and sporadic, primarily for mineral collectors and lapidaries.

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[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Robert G. Marvinney, State Geologist and Director, authored the text of the information submitted by the Maine Geological Survey.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MAINE[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	277	NA	282	NA	352
Sand and gravel, construction	11,300 r	85,900 r	10,200 r	69,100 r	9,090	59,300
Stone:						
Crushed	4,680	37,700	4,020 r	33,900 r	3,600	31,600
Dimension	6	1,580	7	1,720	6	1,300
Combined values of cement, clays (common), peat	XX	53,900	XX	56,000	XX	32,600
Total	XX	179,000 r	XX	161,000 r	XX	125,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MAINE: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	6 r	1,610 r	$11,400 r	6	1,540	$12,200
Granite	7	1,630	15,800	6	1,260	12,000
Sandstone and quartzite	3	427	3,750	3	404	3,610
Miscellaneous stone	6 r	348 r	2,890 r	8	392	3,800
Total	XX	4,020 r	33,900 r	XX	3,600	31,600

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
MAINE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	25	319
Filter stone	28	382
Other coarse aggregate	100	924
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Other graded coarse aggregate	44	358
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Screening, undesignated	W	W
Other fine aggregate	19	241
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	55	828
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]		
Reported	1,610	15,300
Estimated	1,130	9,750
Total	3,600	31,600

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Estimated production without a breakdown by end use.

TABLE 4
MAINE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	434	$2,320	$5.34
Plaster and gunite sands	60	365	6.08
Concrete products (blocks, bricks, pipe, decorative, etc.)	4	35	8.75
Asphaltic concrete aggregates and other bituminous mixtures	235	1,460	6.21
Road base and coverings	1,230	7,710	6.25
Fill	575	2,140	3.73
Snow and ice control	102	563	5.52
Railroad ballast	10	150	15.00
Other miscellaneous uses[2]	34	503	14.79
Unspecified:[3]			
Reported	471	4,230	8.99
Estimated	5,930	39,800	6.71
Total or average	9,090	59,300	6.52

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes filtration.
[3]Reported and estimated production without a breakdown by end use.

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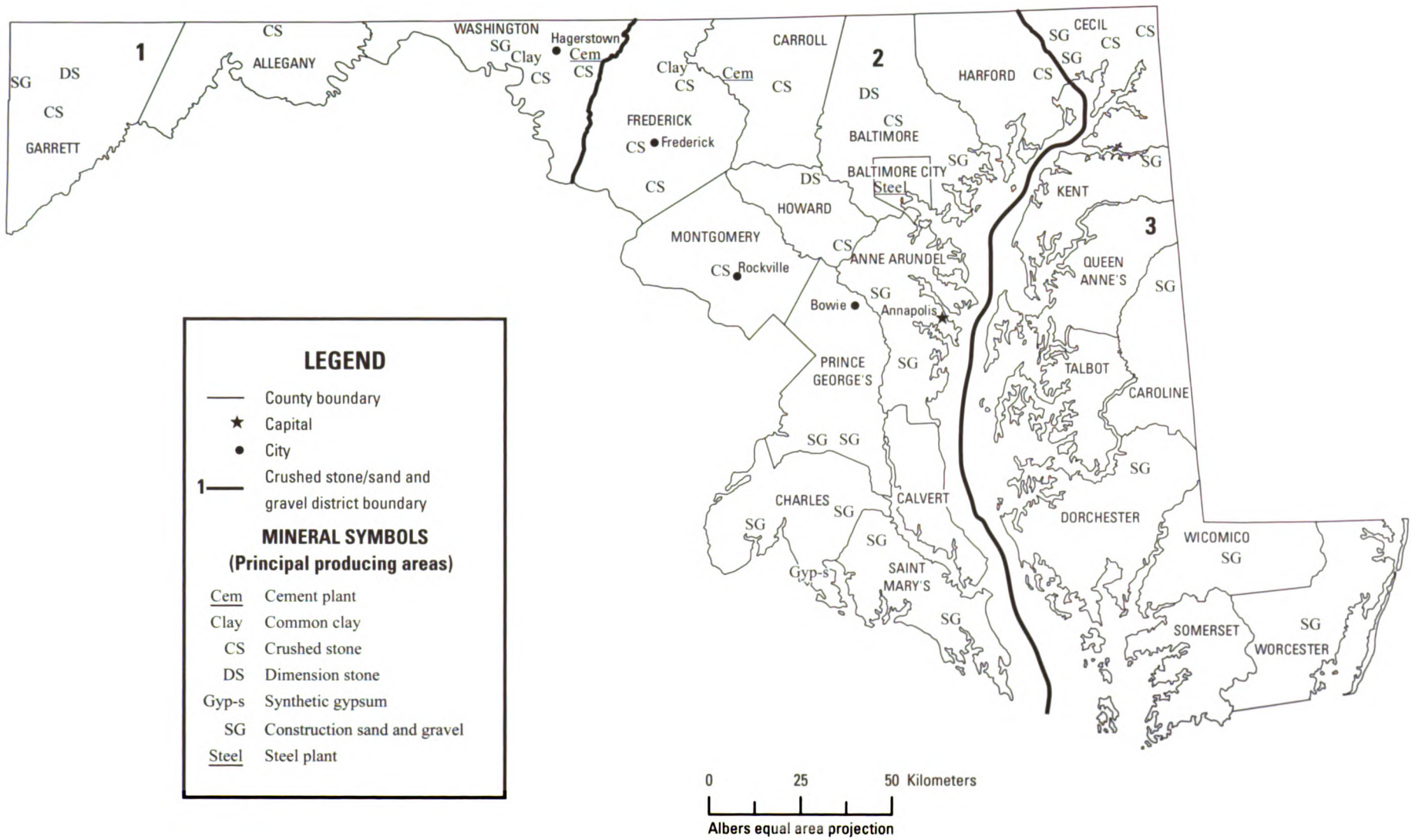
MARYLAND



Source: Maryland Department of the Environment/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MARYLAND

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Maryland Department of the Environment, Minerals, Oil, and Gas Division, for collecting information on all nonfuel minerals.

In 2009, Maryland's nonfuel raw mineral production[1] was valued at $497 million, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of $145 million, or almost 23%, from the State's total of $642 million in 2008, which followed a $30 million, or 4%, decrease from $672 million in 2007. The State, which had ranked 36th in 2008, rose to 34th among the 50 States in total nonfuel raw mineral production value, accounting for 0.84% of the total United States production value of $59 billion. Several significant mineral commodities produced in the State—portland and masonry cement, common clays, and dimension stone—have their respective production and production value data withheld to protect company proprietary data.

Crushed stone and construction sand and gravel, based upon production value, were Maryland's leading nonfuel raw mineral commodities, which accounted for 60% of the State's total nonfuel mineral production value, up slightly from almost 57% in 2008. Production of construction sand and gravel decreased from 12 million metric tons (Mt) in 2008 to less than 8 Mt in 2009, or 34%. The production value of this mineral commodity decreased from $126 million in 2008 to $99 million in 2009, or 21%. From 2007 to 2008, production of construction sand and gravel in the State decreased 3%, but the production value rose by almost the same percentage.

The quantity of crushed stone produced in Maryland in 2009 decreased by more than 3.8 Mt, or almost 15%, and the production value was down by about $37 million, or almost 16%, from that of 2008. The production of crushed stone in 2008 decreased by 8.8 Mt, or 28%, compared with the total of 31 Mt in 2007, and the production value decreased by $82 million, or 29%, from the total of $282 million in 2007 (table 1).

All nonfuel mineral commodities mined in Maryland were industrial minerals. All metal production, especially that of raw steel in the Baltimore area, consisted of the processing and refining of materials received from other domestic and foreign sources.

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MARYLAND[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	3,000	265,000 e	W	(3)	W	(3)
Clays, common	173	W	W	(3)	W	(3)
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	12,400	123,000	12,000	126,000	7,980	99,200
Industrial	--	--	W	(3)	--	--
Stone:						
Crushed	31,100	282,000	26,100 r	237,000 r	22,300	200,000
Dimension	17	2,680	W	(3)	W	(3)
Combined values of cement (masonry) and values indicated by footnote 3	XX	W	XX	279,000	XX	198,000
Total	XX	672,000	XX	642,000 r	XX	497,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable. -- Zero.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to three significant digits; may not add to totals shown.

[3]Withheld values included in "Combined values" data.

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TABLE 2
MARYLAND: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	16	15,500	$131,000	16	13,100	$110,000
Granite	4 r	5,700 r	52,400 r	4	5,160	45,500
Traprock	3	4,100	45,300	3	3,250	35,900
Sandstone and quartzite	4	153	1,810	3	93	1,290
Miscellaneous stone	3	676	6,510	3	784	6,930
Total	XX	26,100 r	237,000 r	XX	22,300	200,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
MARYLAND: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	69	1,230
Filter stone	W	W
Other coarse aggregate	474	6,220
Coarse aggregate, graded:		
Concrete aggregate, coarse	197	1,920
Bituminous aggregate, coarse	783	9,380
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	3,160	33,500
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Other fine aggregate	1,160	8,350
Coarse and fine aggregates:		
Graded road base or subbase	890	8,140
Unpaved road surfacing	W	W
Crusher run or fill or waste	259	2,490
Roofing granules	W	W
Other coarse and fine aggregates	2,740	23,100
Other construction materials	18	168
Agricultural, limestone	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Sulfur oxide removal	W	W
Unspecified:[2]		
Reported	995	12,100
Estimated	11,100	87,100
Total	22,300	200,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
MARYLAND: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	531	7,040	W	W
Coarse aggregate, graded[3]	W	W	3,870	39,700	W	W
Fine aggregate (-⅜ inch)[4]	W	W	1,250	9,780	W	W
Coarse and fine aggregate[5]	W	W	2,250	19,500	W	W
Other construction materials	3	33	15	135	--	--
Agricultural[6]	W	W	W	W	--	--
Chemical and metallurgical[7]	W	W	W	W	--	--
Unspecified:[8]						
Reported	932	11,400	--	--	63	770
Estimated	1,170	7,510	7,460	61,400	2,420	18,200
Total	2,710	24,600	15,400	138,000	4,200	37,600

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, riprap and jetty stone and other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement manufacture and sulfur oxide removal.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
MARYLAND: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,060	$41,800	$13.65
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	18	171	9.50
Asphaltic concrete aggregates and other bituminous mixtures	18	172	9.56
Road base and coverings[3]	135	1,410	10.47
Other miscellaneous uses[4]	470	1,780	3.78
Unspecified:[5]			
Reported	514	7,010	13.65
Estimated	3,760	46,800	12.45
Total or average	7,980	99,200	12.43

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes golf course, fill, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6
MARYLAND: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1,2]

(Thousand metric tons and thousand dollars)

Use	Districts 1 and 2		District 3	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[3]	2,770	39,800	309	2,190
Asphaltic concrete aggregates and road base materials[4]	W	W	W	W
Other miscellaneous uses[5]	393	2,360	230	1,010
Unspecified:[6]				
Reported	505	6,870	10	147
Estimated	26	324	3,730	46,500
Total	3,700	49,400	4,280	49,800

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Specified districts are combined to avoid disclosing company proprietary data.

[3]Includes plaster and gunite sands.

[4]Includes road and other stabilization (lime).

[5]Includes golf course, fill, and snow and ice control.

[6]Reported and estimated production without a breakdown by end use.

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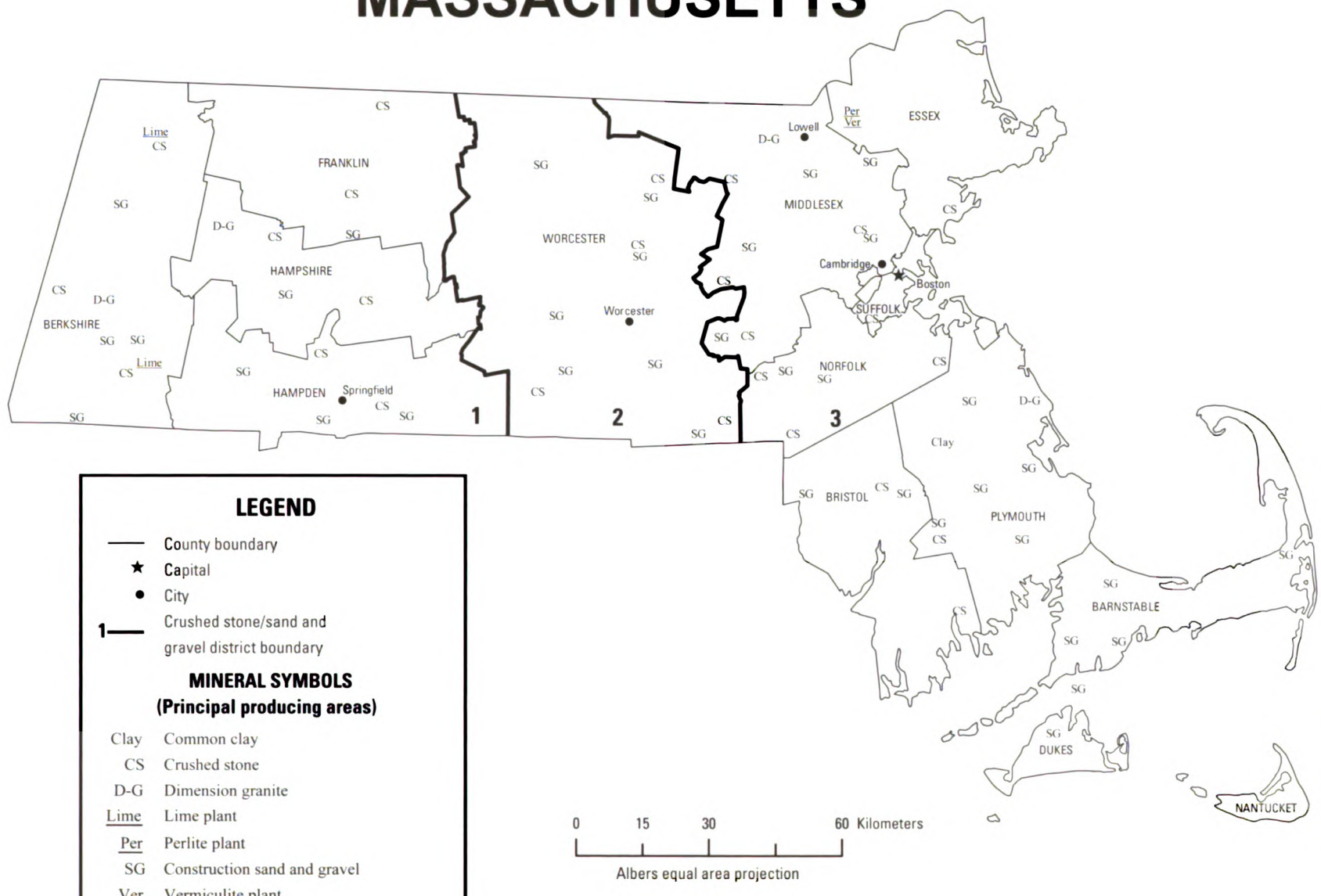
MASSACHUSETTS



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
Lime	Lime plant
Per	Perlite plant
SG	Construction sand and gravel
Ver	Vermiculite plant

Source: Massachusetts Office of the State Geologist/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MASSACHUSETTS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Massachusetts Office of the State Geologist for collecting information on all nonfuel minerals.

In 2009, Massachusetts nonfuel raw mineral production[1] was valued at $214 million, based upon annual U.S. Geological Survey data. This was a $32 million, or a 13%, decrease from the State's total nonfuel mineral value of $246 million in 2008, which had decreased by $47 million, or 16%, from the production value total of $293 million in 2007. The State decreased in rank to 41st from 40th among the 50 States for total nonfuel mineral production value. The State's leading nonfuel mineral commodities were, in descending order of production value, crushed stone and construction sand and gravel, accounting for 97% of the State's total reported value. Because production and production value data for lime and for common clays have been withheld for certain years, the State's actual total nonfuel mineral values for 2007–09 are higher than those reported in table 1.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

In 2009, as in 2008, all of the State's mineral commodities experienced a decline in quantities produced and production value. In descending order, the greatest decreases were seen with construction sand and gravel, crushed stone, and dimension stone, for a combined decrease of 2.5 million metric tons (Mt) from 2008, which followed a combined decrease of 5.7 Mt from 2007–08. Total production values for these commodities were down by more than $24 million, $8 million, and $1 million, or about 22%, 6%, and 14%, respectively, from 2008 (table 1). From 2007 to 2008, production values for these three mineral commodities declined by $31 million, $10 million, and $4.9 million, or almost 22%, 7%, and almost 41%, respectively.

Although production was down 9,000 metric tons (t) from 53,000 in 2008 to 44,000 in 2009, Massachusetts rose in rank to 9th from 10th among the 37 dimension stone-producing States. The State had ranked fourth in the Nation in 2007, producing 98,000 t. Additionally, one company in Essex County produced expanded perlite and exfoliated vermiculite products for horticultural, commercial, and industrial applications from source materials obtained from outside of the State.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MASSACHUSETTS[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	31	W	24	W	W	W
Gemstones, natural	NA	1	NA	1	NA	1
Lime	W	W	W	W	W	W
Sand and gravel, construction	15,800	141,000	11,300 r	110,000 r	9,460	85,600
Stone:						
Crushed	12,300	140,000	11,200 r	130,000 r	10,500	122,000
Dimension	98	12,000	53	7,140	44	6,130
Total	XX	293,000	XX	246,000 r	XX	214,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to three significant digits; may not add to totals shown.

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TABLE 2
MASSACHUSETTS: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	4	768	$16,900	4	1,560	$28,100
Granite	11	3,300	35,200	11	3,240	34,000
Traprock	19	5,570	59,400	17	4,510	46,700
Miscellaneous stone	8 r	1,550 r	18,000 r	10	1,230	13,300
Total	XX	11,200 r	130,000 r	XX	10,500	122,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
MASSACHUSETTS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	W	W
Other coarse aggregate	W	W
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	W	W
Fine aggregate (- ⅜ inch), other	W	W
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Crusher run or fill or waste	W	W
Unspecified:[2]		
Reported	5,800	63,500
Estimated	4,410	55,200
Total	10,500	122,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
MASSACHUSETTS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	--	--	W	W	W	W
Coarse aggregate, graded[3]	--	--	W	W	W	W
Fine aggregate (-⅜ inch)[4]	--	--	--	--	W	W
Coarse and fine aggregates[5]	--	--	W	W	W	W
Unspecified:[6]						
Reported	915	14,200	528	4,650	4,360	44,700
Estimated	1,940	28,200	996	11,000	1,480	16,100
Total	2,860	42,400	1,560	16,000	6,130	63,800

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes riprap and jetty stone and other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast and other graded coarse aggregate.

[4]Includes other fine aggregate.

[5]Includes crusher run or fill or waste and graded road base or subbase.

[6]Reported and estimated production without a breakdown by end use.

TABLE 5
MASSACHUSETTS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate	1,950	$18,200	$9.30
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	64	547	8.55
Asphaltic concrete aggregates and other bituminous mixtures	330	4,790	14.53
Road base and coverings[3]	310	3,790	12.21
Fill	713	3,820	5.36
Snow and ice control	182	2,280	12.53
Filtration	79	888	11.24
Other miscellaneous uses[4]	78	496	6.36
Unspecified:[5]			
Reported	883	6,130	6.94
Estimated	4,870	44,700	9.18
Total or average	9,460	85,600	9.05

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes golf course, railroad ballast, and roofing granules.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6

MASSACHUSETTS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	413	3,960	444	4,110	1,160	10,600	--	--
Asphaltic concrete aggregates and road base materials[3]	202	2,900	380	4,800	59	879	--	--
Fill	297	1,650	258	1,370	157	792	--	--
Snow and ice control	49	699	69	714	64	868	--	--
Other miscellaneous uses[4]	7	81	96	807	54	497	--	--
Unspecified:[5]								
Reported	664	4,140	111	980	29	222	79	785
Estimated	961	8,430	615	5,520	3,290	30,700	--	--
Total	2,590	21,900	1,970	18,300	4,820	44,600	79	785

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes filtration, golf course, railroad ballast, and roofing granules.

[5]Reported and estimated production without a breakdown by end use.

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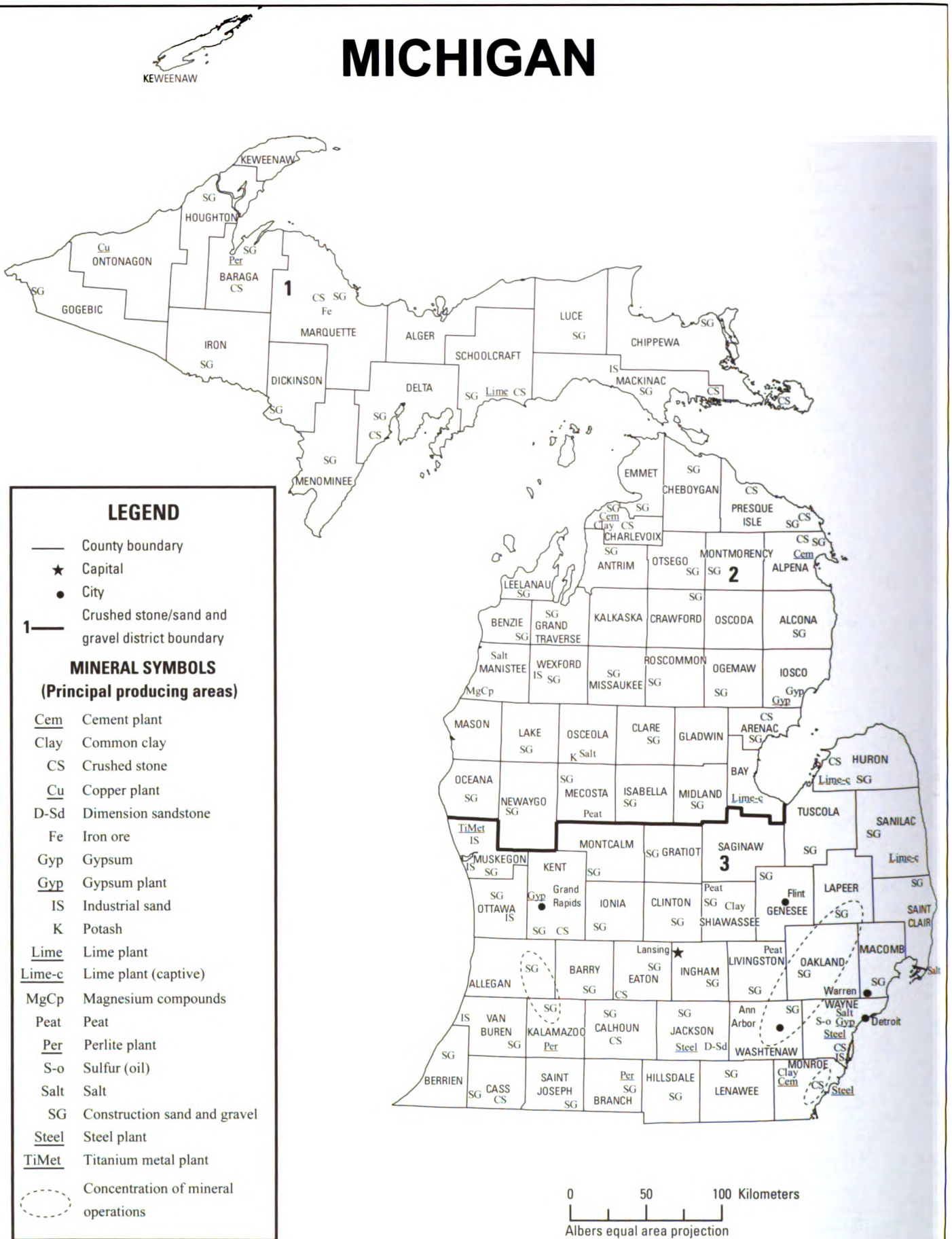
MICHIGAN



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper plant
D-Sd	Dimension sandstone
Fe	Iron ore
Gyp	Gypsum
Gyp	Gypsum plant
IS	Industrial sand
K	Potash
Lime	Lime plant
Lime-c	Lime plant (captive)
MgCp	Magnesium compounds
Peat	Peat
Per	Perlite plant
S-o	Sulfur (oil)
Salt	Salt
SG	Construction sand and gravel
Steel	Steel plant
TiMet	Titanium metal plant
⬭	Concentration of mineral operations

Sou[illegible]ichigan Department of Environmental Quality, Office of the Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MICHIGAN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Michigan Department of Environmental Quality, Office of Oil, Gas, and Minerals for collecting information on all nonfuel minerals.

In 2009, Michigan's nonfuel raw mineral production[1] was valued at $1.76 billion, based upon annual U.S. Geological Survey (USGS) data. This was about a $260 million, or nearly 13%, decrease from the State's total nonfuel mineral production value for 2008, which had increased by $56.5 million, or 2.9%, from 2007 to 2008. The State rose in rank to 11th from 12th among the 50 States in total nonfuel mineral production value, producing nearly 3% of the U.S. total of $59 billion.

Iron ore remained Michigan's leading nonfuel mineral commodity by production value followed by, in descending order of production value, portland cement, construction sand and gravel, salt, crushed stone, and magnesium compounds. The combined production value of these six minerals accounted for more than 95% of the State's total nonfuel mineral production value.

In 2009, iron ore had the largest increase to production value (actual data withheld—company proprietary data). Industrial sand and gravel production value increased by $931,000, or by 3.5%, which followed an increase in the production value of salt (actual data withheld—company proprietary data). All other mineral commodities produced in the State decreased in production value, led by portland cement, down by $152 million, which accounted for 59% of the States total decrease in production value. Significant decreases also took place in construction sand and gravel, down by $35 million, or by 16%, and crushed stone, down by $21 million, or by 15%.

Dimension stone was the only nonfuel mineral commodity that increased in production quantity and the production of peat remained about the same from 2008 to 2009 (actual data withheld for both—company proprietary data). All other mineral commodities decreased in production with a considerable decrease in the production quantity of construction sand and gravel, down by nearly 11 million metric tons (Mt), or by 23%. Smaller, yet significant, decreases in production quantity also took place in crushed stone, down by almost 5.8 Mt, or by 22%; iron ore, down by 3.6 Mt, or by 29%; portland cement, down by nearly 1.4 Mt, or by 28%; and salt, down by over 30%.

In 2009, Michigan continued to lead the Nation in the production of magnesium compounds among five producing States. The State continued to rank second in the production of iron ore among 4 iron ore-producing States, third in the production of potash among 3 producing States, fourth in the production of construction sand and gravel among 50 producing States, and fifth in the production of portland cement among 36 producing States. Michigan rose in rank to 6th from 8th in the production of industrial sand and gravel, to 8th from 9th in the production of gypsum, to 9th from 10th in the production of masonry cement, and to 17th from 20th in the production of common clay. The State dropped in rank to 7th from 6th in the production of salt and to 14th from 13th in the production of lime.

The following narrative information was provided by the Michigan Department of Environmental Quality (MDEQ), Office of Oil, Gas, and Minerals (OOGS).[2] Production data and other information in the following text are those reported by the MDEQ, based upon its research, surveys, and estimates. Mineral production data may differ from production figures reported to the USGS.

Industry Overview

Michigan's production of industrial minerals was largely dependent on the construction industry. Low levels of road and home construction led to less production of industrial minerals. Iron ore continued to be mined at two large open pit mines and processed into pellets in Marquette County. One old mine in Ontonagon County continued to produce copper and related minerals for sales as specimens to museums and mineral collectors. Copper ingots continued to be shipped by rail from Canada to the electrolytic refinery in Ontonagon County. Iron and steel production remained dependent upon the State's automobile industry.

Exploration

In fiscal year 2009 (October 1, 2008, through September 30, 2009), three companies conducted exploration drilling for metallic mineral deposits in Baraga, Gogebic, and Marquette Counties. These companies drilled 103 holes for a total drilling distance of 18,400 meters (60,300 feet). The MDEQ, Office of Geological Survey regulates exploration drilling (Melanie Humphrey, Geological Technician, Michigan Department of Environmental Quality, Office of Geological Survey, U.P. District Office, written commun., October 26, 2009).

Commodity Review

Industrial Minerals

Cement.—An engineered cementitous composite, also known as bendable concrete, with self-healing capabilities was

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at http://minerals.usgs.gov/minerals.

[2]The text of the State mineral industry information was compiled and edited by Milton A. Gere, Jr., Geologist (retired), formerly of the Michigan Department of Natural Resources.

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developed at the University of Michigan, Ann Arbor, Washtenaw County. This improved concrete may help alleviate the need for demolition and replacement of concrete after subjection to heavy stress. Exposure to moisture and carbon dioxide allows the stressed concrete to heal microscopic cracks and may make concrete last longer (Science Daily, 2009).

The Michigan House of Representatives' Education Committee authorized Michigan's community colleges to provide programs offering baccalaureate degrees in concrete technology. The Alpena Community College had previously offered an associate degree in concrete technology (Aggregate Research, 2009b).

Limestone.—A building used for maintenance at the Carmeuse Lime and Stone's (Pittsburgh, PA) limestone quarry near Rogers City in Presque Isle County was destroyed by fire in early March. No one was injured in the fire, but the building was considered a total loss. Investigators were trying to determine the cause of the fire (Aggregate Research, 2009a).

Sand and Gravel, Construction.—At a public meeting in January, the Planning Commission of Waterloo Township voted to accept Aggregate Industries Management, Inc.'s (Waltham, MA) application for a special land-use permit to allow the company to expand its pit owing to the company's noise mitigation proposals (Dunphy, 2009a). In early August, the Portage Township Board meeting was working on a solution for the excessive noise complaints that residents had with the Valley View Quarry operators. A subcommittee planned to meet with the gravel pit operators to arrive at a solution (Mining Journal, The, 2009b). Kentwood Excavating, Inc. (Grand Rapids, MI) began development of its proposed sand and gravel production site after settling a3- year-old lawsuit with Caledonia Township in Kent County. Kentwood agreed to create a buffer zone around the site, limit hours of production, plant vegetation, pave a street to the site, and construct a bike path along the street (Dunphy, 2009b).

Metals

Copper and Nickel.—Kennecott Eagle Minerals Co. (subsidiary of Rio Tinto, plc) deferred development of the Eagle Mine, a copper and nickel mine in Marquette County, until market conditions recover. The company was expected to continue working on permitting and litigation issues. The Eagle Mine, an $80 million project, included mining 2 hectares (ha) (6 acres) underground and was expected to yield 110,000 to 140,000 metric tons (t) (250 to 300 million pounds) of nickel and 90,000 t (200 million pounds) of copper during the mine's lifetime (Pepin, 2009a). The lawsuit contesting Kennecott's leasing of about 50 ha (120 acres) of State land for the Eagle Mine was dismissed by an Ingham County circuit judge (Flesher, 2009).

The MDEQ made a preliminary decision to grant permits to Kennecott to reuse to the old Humboldt Mill in Marquette County to process approximately 1,400 t (1,500 short tons) of ore per day from the Eagle Mine. The company expected the mill to employ 70 full-time workers. The project would require 100 to 200 local contractors to prepare the site. The company planned to dispose of waste rock in the old Humboldt Mine pit located near the mill. The mill may be upgraded to process material from other mining projects in the region (Pepin, 2009b). A public hearing about the reuse of the mill was held in western Marquette County in December. A letter in support of Kennecott's proposal signed by the Marquette County Board was read. Written responses from the community were accepted until December 29 (Boyle, 2009a).

Kennecott joined an aggregate producer, land owners, and logging interests to form Woodland Road LLC. Woodland Road proposed a 35-kilometer (km) (22-mile) privately owned road that would connect the Eagle Mine and the Humboldt mill. The road would shorten the originally planned route on public roads by about 60 km (38 miles) and avoid population centers and traffic. The cost of building the road was expected to be $50 million and employ 125 workers for construction and 12 workers for maintenance. The road was planned to be open to the public (Pepin, 2009c). In November, the MDEQ asked the court to reconsider the recommendation to only grant permits to Kennecott for the Eagle Mine if steps are taken to protect Eagle Rock, an area of spiritual significance for local Native American tribes. Kennecott planned to locate the entrance to Eagle Mine near the outcrop (Mining Journal, The, 2009a).

In June, HudBay Minerals Inc. (Toronto, Ontario, Canada) announced plans to close its electrolytic copper refinery in White Pine, Ontonagon County. The company closed its copper smelter in Flin Flon, Manitoba, Canada, and planned to stop sending copper anodes to White Pine for refining. The closure would eliminate 65 jobs in White Pine (HudBay Minerals Inc., 2009a).

Red Metal Minerals' Caledonia Mine in Ontonagon County remained the State's sole copper-producing mine. This small-scale operation produced copper mineral specimens for sale to museums, schools, and private mineral collectors.

Gold and Zinc.—In August, HudBay announced plans to buy a 15% stake in Aquila Resources Inc. and obtain the rights to buy a majority interest in Aquila's Back Forty project, an advanced-staged exploration project delineating a gold- and zinc-rich volcanogenic massive sulfide deposit in Menominee County. HudBay planned to send zinc concentrates from the Back Forty Project to their metallurgical complex in Flin Flon, Manitoba, Canada (HudBay Minerals Inc., 2009b).

Iron Ore and Iron and Steel.—Cliffs Natural Resources Inc. (Cleveland, OH) operated the State's two iron ore-producing mines, the Empire and Tilden Mines, in Marquette County. The company delayed capital projects that would have increased the output of the two mines. In 2009, the output from the Empire and Tilden Mines and associated processing facilities was 2.6 million metric tons (Mt) and 5.7 Mt of iron ore pellets, respectively. As part of an annual program, Cliffs supported a new tree planting initiative along the Iron Ore Heritage Trail by providing financial assistance for the purchase and planting of 75 conifer trees between Negaunee and Ishpeming (Cliffs Natural Resources Inc., 2009a, b). Iron ore and other Great Lakes shipping was slow in 2009 owing to low demand for steel and other commodities (Boyle, 2009b).

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Government Activities and Programs

In 2009, leasing of State-owned mineral lands and mineral rights was managed by the Department of Natural Resources, Forest Management Division, Forest, Mineral and Land Management Section, in Lansing. The majority of the income generated by mineral leasing went to the Natural Resources Trust Fund that is used to acquire the mineral rights involved in leasing activities. At the end of fiscal year 2009, approximately 11,900 ha (29,300 acres) were under 136 State metallic mineral leases. No new State metallic mineral leases were issued in 2009. One nomination, almost 8,400 ha (20,700 acres), was in the field review process. There were 64 metallic mineral leases of almost 6,500 ha (15,900 acres) terminated in fiscal year 2009. The total income from metallic mineral activities on State-owned mineral lands was no more than $270,000. One exploration plan for 840 ha (2,070 acres) was approved in fiscal year 2009 for lands previously leased. The metallic mineral exploration was confined to the Precambrian rocks in the western half of the Upper Peninsula (Thomas Hoane, Geologist, Michigan Department of Natural Resources, Forest Mineral and Fire Management, Mineral and Land Management Section, Nonmetallic Mineral Leasing Program, unpub. data, 2010).

At the end of fiscal year 2009, 50 State nonmetallic mineral leases were in place on nearly 1,500 ha (3,670 acres). One lease was nominated for sand and gravel, one for salt, and one for potash. One sand and gravel lease of 30 ha (80 acres) was terminated. One salt lease and two direct sand and gravel leases were issued 2009. Three nominated potash areas, totaling 34,000 ha (84,000 acres), were included in an August sealed bid lease sale. The fiscal year 2009 nonmetallic mineral lease income totaled almost $760,000. The State approved 122 leases, covering 12,700 ha (31,400 acres), to be issued in fiscal year 2010 (Thomas Hoane, Geologist, Michigan Department of Natural Resources, Forest Mineral and Fire Management, Mineral and Land Management Section, Metallic Mineral Leasing Program, unpub. data, 2010).

Limited gold panning on State-owned segments of some rivers was allowed by the MDNR. The State prohibits hobby gold panning and sluicing in river segments with mussel beds, designated trout streams, natural rivers, and natural areas. The limit of gold found, recovered, and kept is 15.6 grams (0.5 troy ounces) per person per year.

In 2009, the State election Board approved the MiWater ballot initiative, which would amend part 632 of the State's Natural Resources and Environmental Protection Act. The initiative would place restrictions and additional regulations on the mining of sulfide ore. About 400,000 signatures were needed to place the initiative on the November 2010 ballot (Hauglie, 2009).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	149	20,200 e	99	12,000 e	80	9,800 e
Portland	5,490	537,000 e	4,930	502,000 e	3,550	350,000 e
Clays, common	533	2,250	365	1,730	318	1,310
Gemstones, natural	NA	2	NA	2	NA	2
Gypsum, crude	841 r	5,100 r	603 r	4,490 r	372	3,110
Iron ore, usable shipped	12,200	W	12,500 r	W	8,870	W
Sand and gravel:						
Construction	57,100 r	231,000 r	45,100 r	211,000 r	34,600	176,000
Industrial	1,360	30,000	1,500	26,800	1,330	27,700
Stone, crushed	26,800	130,000	26,100 r	136,000 r	20,400	115,000
Combined values of lime, magnesium compounds, peat, potash, salt, stone (dimension dolomite and sandstone), and values indicated by symbol W	XX	1,010,000	XX	1,130,000	XX	1,080,000
Total	XX	1,970,000	XX	2,020,000 r	XX	1,760,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MICHIGAN: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity r (thousand metric tons)	Value r (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	22 r	20,500	$107,000	21	15,700	$93,400
Dolomite	4	5,060	27,400	4	3,860	19,900
Miscellaneous stone	16	615	1,090	17	791	1,960
Total	XX	26,100 r	136,000 r	XX	20,400	115,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite; reported with no distinction between the two.

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TABLE 3
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	83	1,440
Filter stone	W	W
Other coarse aggregate	114	1,210
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,390	16,100
Bituminous aggregate, coarse	600	4,170
Bituminous surface-treatment aggregate	W	W
Other graded coarse aggregate	464	2,590
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	151	627
Other fine aggregate	341	6,240
Coarse and fine aggregates:		
Graded road base or subbase	1,710	11,600
Unpaved road surfacing	679	1,580
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	600	4,660
Agricultural:		
Limestone	W	W
Other agricultural uses	40	180
Chemical and metallurgical:		
Cement manufacture	W	W
Flux stone	W	W
Special, other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	W	W
Unspecified:[2]		
Reported	3,140	21,500
Estimated	6,000	31,000
Total	20,400	115,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	192	2,650
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregate[5]	W	W	W	W	W	W
Agricultural[6]	W	W	W	W	W	W
Chemical and metallurgical[7]	W	W	W	W	--	--
Special[8]	--	--	W	W	--	--
Other miscellaneous uses	--	--	--	--	W	W
Unspecified:[9]						
Reported	3	14	1,240	6,170	1,900	15,300
Estimated	3,060	15,900	2,430	11,600	506	3,430
Total	6,790	32,900	6,270	24,000	7,310	58,400

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[4]Includes stone sand (concrete), stone sand (bituminous mix or seal), screening (undesignated), and other fine aggregates.
[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes limestone and other agricultural uses.
[7]Includes cement manufacture and flux stone.
[8]Includes other fillers or extenders.
[9]Reported and estimated production without a breakdown by end use.

TABLE 5
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,980	$17,900	$6.01
Plaster and gunite sands	66	291	4.41
Concrete products (blocks, bricks, pipe, decorative, etc.)	17	144	8.47
Asphaltic concrete aggregates and other bituminous mixtures	2,670	16,600	6.24
Road base and coverings	4,770	27,500	5.77
Road and other stabilization (cement)	84	555	6.61
Road and other stabilization (lime)	196	1,780	9.08
Fill	3,920	9,620	2.45
Snow and ice control	235	1,060	4.51
Railroad ballast	4	39	9.75
Filtration	40	264	6.60
Other miscellaneous uses	67	382	5.70
Unspecified:[2]			
Reported	4,270	26,000	6.10
Estimated	15,200	73,900	4.85
Total or average	34,600	176,000	5.10

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 6

MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)	250	2,360	599	2,970	2,130	12,600
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	76	387	W	W	W	W
Asphaltic concrete aggregates and other bituminous mixtures	120	722	W	W	W	W
Road base and coverings	1,020	8,020	1,100	4,740	2,650	14,700
Road and other stabilization (cement and lime)	--	--	--	--	275	2,330
Fill	86	187	354	752	3,480	8,680
Other miscellaneous uses[3]	31	193	138	516	1,490	9,140
Unspecified:[4]						
Reported	36	205	27	235	3,970	24,100
Estimated	698	3,360	2,910	14,400	11,600	56,100
Total	2,310	15,400	6,290	30,900	25,700	128,000

	Unspecified districts	
Use	Quantity	Value
Concrete aggregate (including concrete sand)	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	--	--
Asphaltic concrete aggregates and other bituminous mixtures	--	--
Road base and coverings	--	--
Road and other stabilization (cement and lime)	--	--
Fill	--	--
Other miscellaneous uses[3]	--	--
Unspecified:[4]		
Reported	239	1,480
Estimated	--	--
Total	239	1,480

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes filtration, railroad ballast, and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

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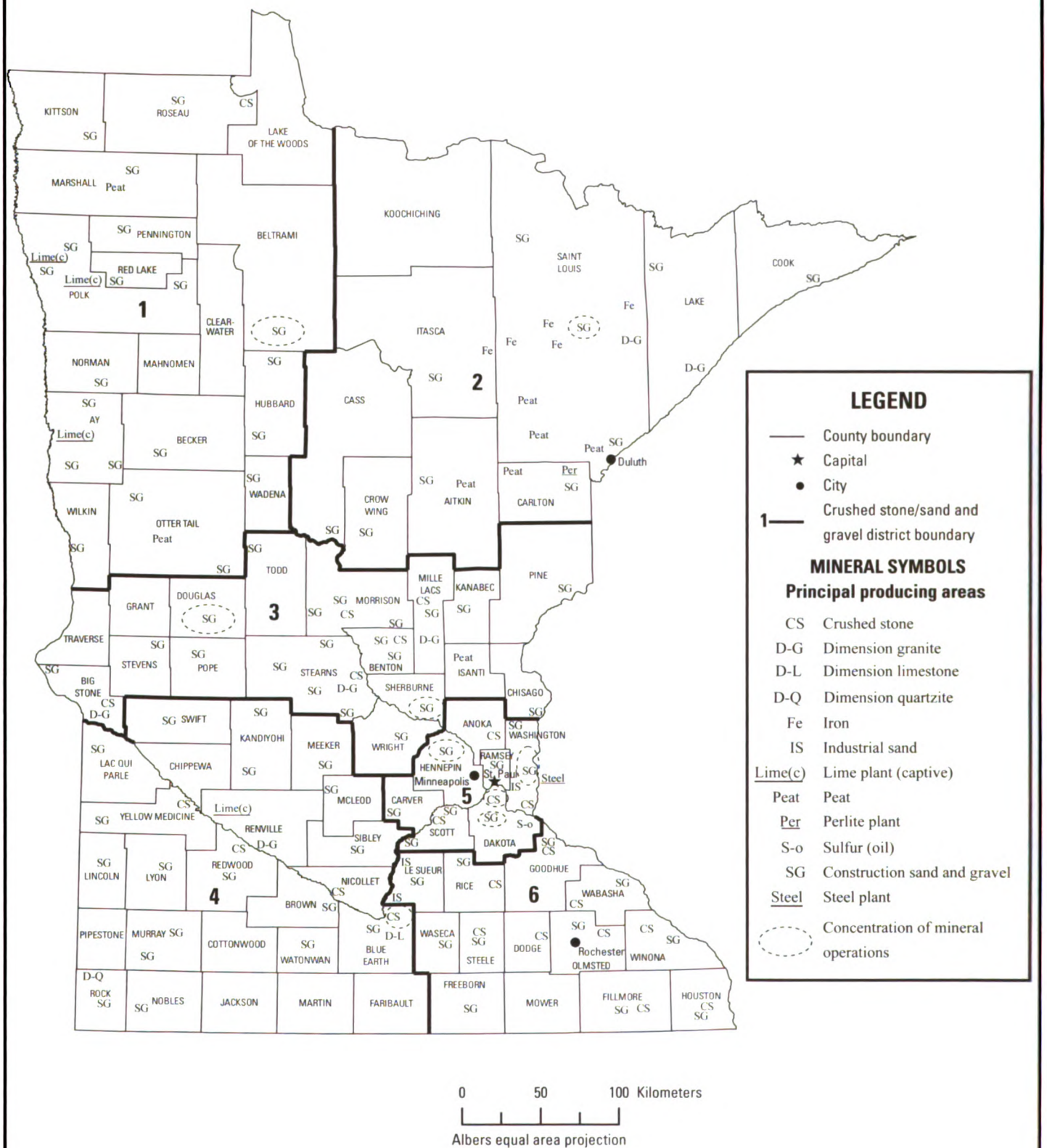
MINNESOTA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
Principal producing areas

CS	Crushed stone
D-G	Dimension granite
D-L	Dimension limestone
D-Q	Dimension quartzite
Fe	Iron
IS	Industrial sand
Lime(c)	Lime plant (captive)
Peat	Peat
Per	Perlite plant
S-o	Sulfur (oil)
SG	Construction sand and gravel
Steel	Steel plant

Concentration of mineral operations

Source: Minnesota Department of Natural Resources, Division of Lands and Minerals/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MINNESOTA

In 2009, Minnesota's total nonfuel raw mineral production[1] was valued at $2.15 billion based upon annual U.S. Geological Survey (USGS) data. This was a $1.31 billion, or an almost 38%, decrease from the State's total nonfuel mineral value of $3.46 billion in 2008, which had increased by $670 million, or 24%, from a total of $2.79 billion in 2007. Minnesota declined in rank to eighth from seventh among the 50 States in total nonfuel mineral production value, and the State accounted for nearly 3.7% of the U.S. total, down from 4.8% in 2008.

Minnesota continued to be the Nation's leading iron ore-producing State in 2009, and based upon production value, iron ore continued to be the State's leading nonfuel mineral (actual production value data withheld—company proprietary data). In descending order of production value, the next top mineral commodities produced in the State were construction sand and gravel, crushed stone, industrial sand and gravel, and dimension stone. These five mineral commodities accounted for 99% of the State's total nonfuel mineral production value.

Decreases in total production value were seen with every mineral commodity produced in Minnesota in 2009, except gemstones. From 2001 to 2008, Minnesota saw annual increases in total nonfuel mineral production value. The decrease in total nonfuel raw mineral production value in 2009 was primarily the result of an almost 55% decline in the quantity of usable iron ore shipped (actual production values withheld—company proprietary data).

Other significant decreases in production value also took place in the value of construction sand and gravel and crushed stone, down $39 million and $12 million, respectively. By tonnage, both of these mineral commodities combined decreased by a total of 5.5 million metric tons (Mt). Among all States producing construction sand and gravel, Minnesota increased to seventh, up from ninth in 2008. Additionally, the State, which in 2008 and 2009 ranked second in peat production among 12 peat-producing States, saw that mineral commodity decrease in production value from $4.5 million to slightly more than $2.8 million, a decline of almost $1.7 million. The quantity of industrial sand and gravel produced in the State declined by 27% (actual value withheld—company proprietary data).

The following narrative information was provided by the Minnesota Department of Natural Resources' (MDNR)[2] Division of Lands and Minerals (DLM). Production data in the following text are those reported by the DLM, based upon its own surveys and estimates. The data may differ from some production figures reported by the USGS.

In 2009, mining in Minnesota continued in the nonfuel mineral sectors, and a variety of new mineral-related research and mineral exploration activities took place in the State. Identified resources of base metals, construction aggregates, dimension stone, direct-shipping grade iron ore, and peat allowed for prospective opportunities for new mineral development in the State. Geologically, Minnesota has potential for the occurrence of such mineral resources as base and precious metals, diamond, and kaolin. The level of investment in mineral exploration activity was significantly higher than in the past few years and many additional mineral development investment opportunities continued to exist in the State.

Exploration and Development

Industrial Minerals

Clays, Kaolin.—Acme Brick Co. drilled three exploratory auger holes for kaolin and industrial clay in the south-central portion of the State. Kennecott Exploration Co. holds industrial minerals leases at the Tamarack copper-nickel prospect in Aitkin County, roughly 16 km west of Cromwell. While drilling 17 exploratory holes in 2009, the company found kaolin within the 20 to 30 meters (m) of overburden that lies above the mineralized bedrock.

Stone, Dimension.—Cold Spring Granite Company removed test blocks from a new potential granite dimension stone quarry in St. Louis County about 80 km (50 miles) north of Duluth) and applied for a State industrial minerals lease.

Metals

Iron Ore.—Steel Dynamics, Inc. (Fort Wayne, IN), and Kobe Steel, Ltd. (Kobe, Japan), continued to partner in the construction and operation of the Mesabi Nugget plant in Hoyt Lakes, MN, the world's first full-scale commercial plant using the pioneering ITmk3 process developed by Kobe Steel (Kikuchi and others, 2010). The partners completed construction, which began in 2007, and began commissioning the $260 million plant, which has a 55-m (180-foot) diameter gas-fired rotary-hearth furnace (RHF). Through a chemical reduction process, the RHF is expected to yield millions of 96% to 98% iron nuggets. At full capacity, the plant is expected to produce 500,000 metric tons per year (t/yr) of iron nuggets. The announcement of the first production of iron nuggets from the facility was in early January 2010 (Steel Dynamics, 2010).

Essar Steel Minnesota, LLC (a subsidiary of Essar Steel Ltd., Hibbing, MN) broke ground at a site west of Nashwauk, MN, in September 2008 (Bily, 2008). In late 2009, Hammerlund Construction Inc. began excavation of the railroad corridor embankment, with additional plant foundation excavation work planned for 2010 (Hammerlund Construction Inc., 2012). The

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Donald Elsenheimer, Senior Planner, authored the text of information submitted by the Minnesota Department of Natural Resources.

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company had access to significant iron ore resources, and it planned to build an integrated steel plant on the site with an annual capacity of 2.5 Mt upon completion of the estimated $1.65 billion project. The company's strategy included the development of a high-quality ore body, modern commercially proven processing technologies, and a vertically integrated steel mill. This will be the first facility in North America to include iron ore mining, ore processing, direct reduction of ore, and steelmaking at a single site.

Magnetation, Inc. (Grand Rapids, MN), formed in December 2006, began production of iron concentrate from its Mesabi Chief plant near Keewatin, MN. The plant was expected to produce low-cost iron concentrates at an estimated production rate of 300,000 t/yr from lean ore stockpiles. The company looked to expand to a production rate of 750,000 t/yr of concentrate to help feed Steel Dynamics' 500,000 t/yr Mesabi Nugget facility at Hoyt Lakes.

United States Steel Corp. (Pittsburgh, PA) drilled seven exploration holes outside their permit-to-mine area in 2009, in and near Section 16, near Leetonia, St. Louis County. Since this exploration took place outside the permitted mining area for iron ore, these holes are covered by the State's Exploratory Boring law. The law applies to all borings for metallic minerals, iron ore, and certain industrial minerals that are outside of active mine permit areas and allows MDNR to perform drill-site inspections to ensure regulatory compliance and requires the submission of drilling data to the MDNR.

Polymetallic Resources.—Seven companies continued metallic mineral exploration activities in 2009. Six companies focused exploration and development activity within the 1.1-billion-year-old Duluth Complex copper-nickel-platinum-group-metals deposits.

PolyMet Mining Corp. (Vancouver, British Columbia, Canada) planned to drill 132 exploratory borings for the 2009–10 winter to further define the NorthMet deposit ore body near Babbitt. The U.S. Army Corps of Engineers and MDNR released a draft Environmental Impact Statement for the NorthMet project in November, 2009 (MDNR, 2010a). Public information meetings were held on December 9, 2009, in Aurora, and December 10, 2009, in Blaine. Both agencies' comment periods were to end on February 3, 2010. The NorthMet Project would involve development of a new open pit mine and refurbishment and modification of the Cliffs Erie LLC taconite ore-processing facility near Hoyt Lakes, MN, to extract copper, nickel, and other precious metals.

Duluth Metals, Ltd. (Toronto, Ontario), worked to expand its Nokomis copper-nickel-platinum-group-metals deposit via step-out drilling, completing one exploratory boring. The company has drilled 156 exploratory borings since April 2006, with depths varying from approximately 430 to 1,400 m (1,400 to 4,500 feet). Duluth Metals updated its 2008 resource estimate with a Canadian National Instrument (NI) 43–101 Report and a NI 43–101-compliant preliminary assessment. The economic analysis was based on a conceptualized 40,000-metric-tons-per-day production rate from an underground mine.

Kennecott Exploration Co. drilled 17 holes in 2009 on their Tamarack project 80 km (50 miles) southwest of the Duluth Complex in Aitkin County. The Tamarack project consists of a high-grade copper-nickel prospect within a mafic-ultramfic intrusion. The company also explored additional nearby prospects in Aitkin and Carlton Counties.

Franconia Minerals Corp. (Spokane Valley, WA) completed a Canadian NI 43–101 compliant resource estimate for its Birch Lake property and continued to work on a mine waste characterization study. Teck Resources Ltd. (Vancouver, British Columbia, Canada) continued to work on a large assay program for its Mesaba copper-nickel sulfide deposit with existing core stored at the MDNR Drill Core Library in Hibbing. Encampment Minerals, LLC (Golden, CO), performed 13 exploratory borings on 3 separate prospects at various sites in the Duluth Complex.

One company, Vermillion Gold, LLC, drilled the first new exploratory gold borings in Minnesota in more than 13 years. Four exploratory borings were completed on two prospects, one of which was the Wawa Subprovince "Virginia Horn" prospect near Gilbert, southeast of Virginia, near the Mesabi Iron Range. Three areas of known gold mineralization in the Archean Superior Province greenstone belts were actively explored by mineral companies in 2009.

In total, five mineral companies completed a total of 42 exploratory borings under the State's Exploratory Boring law, with a total of more than 10,100 m (about 33,300 feet) of core obtained in 2009.

Commodity Review

Industrial Minerals

Peat.—Ten peat mining operations were covered under the permit-to-mine program in 2009. The peat mining operations included active harvesting, product research and development, and site reclamation. The majority of the peat produced in Minnesota was used in horticultural applications.

Aitkin Agri-Peat, Inc. leased about 445 hectares (ha) (1,100 acres) of State and county tax-forfeited lands east of Cromwell in Carlton County (about 56 km west of Duluth). The company was actively working almost 51 ha (125 acres) and produced more than 34,600 cubic meters (m^3) of sphagnum peat. On private land north of McGregor, Aitkin County, the company mined 97 ha (about 240 acres), producing about 26,300 m^3 of reed-sedge peat.

In the same vicinity, three other companies produced peat products. Premier Horticulture, Inc., leased about 202 ha (499 acres) of State and county tax-forfeited lands northwest of Cromwell. The company produced about 89,000 m^3 of spaghnum peat on approximately 125 ha (310 acres). The closure of the final 7 ha (17 acres) of its oldest mine area in 2009 brought its total area under active reclamation to 25 ha (63 acres). Sampson Farms, east of Aitkin in Aitkin County, mined on about 32 ha (78 acres) of privately held land with a production of almost 46,000 m^3 of brown moss (hypnum) peat.

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A portion of this peat product was used in product development research for remediation of streams damaged by heavy metals. Thompson Farms, northeast of Aitkin, produced 1,150 m^3 of brown moss peat from approximately 0.4 ha (1 acre), though the company leased 32 ha (80 acres).

Conrad Fafard, Inc., operated on approximately 105 ha (260 acres) of State-leased land east of Floodwood, St. Louis County, producing just under 53,600 m^3 of sphagnum peat. Hawkes Company, Inc., located northeast of Newfolden in Marshall County, mined on about 87 ha (215 acres) of private and State-leased land, producing about 16,100 m^3 of reed-sedge peat. The total area in reclamation by the company in 2009 was almost 8 ha (19 acres); an additional 60 ha (149 acres) were previously reclaimed by the company and released from the Permit to Mine program. Northwoods Organics of Minnesota, LLC (formerly Waupaca Northwoods, LLC), operated on 115 ha (285 acres) of county tax-forfeited land south of Toivola in St. Louis County, producing about 81,800 m^3 of sphagnum peat.

Berger Horticultural Products, Ltd., leased 469 ha (1,160 acres) of State-owned peatland northwest of Big Falls in the Pine Island bog of west-central Koochiching County. No production occurred in 2009. Ferweda General Contracting leased about 65 ha (160 acres) of State-owned peatland northwest of Cotton, St. Louis County. No mining took place in 2009, though a limited amount of reed-sedge product was produced using peat stockpiled by the previous operator, and research continued into use of peat mixes as absorbents.

Sand, Industrial.—The application of silica sand used for the hydraulic fracturing process drove exploration for new resources, preparations for mine expansion, and development of processing plants in Minnesota. Known sources of silica sand were mined from the quartzose lithofacies of the Cambrian Jordan Sandstone, previously known as the Van Oser Member, which crops out in numerous places in counties bordering the Minnesota River, Mississippi River, and St. Croix River. Other potential sources of silica sand include the Ordovician St. Peter Sandstone and the Cambrian Wonewoc Sandstone. Similar to construction sand and gravel mining, permitting for industrial sand operations is done by local government authorities rather than the State government.

Sand and Gravel, Construction, and Crushed Stone.—Production of construction aggregate in Minnesota remained significantly lower than in previous years. Declining levels of aggregate production continue to reflect the slowdown in new residential and commercial construction. Construction aggregate is produced in every county and is mainly used in road maintenance and construction. Permitting of crushed stone quarries and sand and gravel operations is done by local governments.

Metals

Iron Ore.—Minnesota produced about 17.4 Mt of high-grade iron ore in 2009; nearly all of the final product shipped was in the form of pellets with small quantities of chips and concentrates. Iron ore mining in the State was conducted in open pit mines along the Biwabik Iron Formation, along the Mesabi Iron Range, although a minor amount of production came from reworked tailings. Nearly all of the iron ore shipped from Minnesota in 2009 was used in blast furnaces in the United States and Canada to make pig iron and then ultimately steel.

Iron ore production was down considerably from the 39.8 Mt produced in 2008 and was the lowest level of production in Minnesota since the Great Depression. The drop in production was owing to the global financial crisis. Although operations in Minnesota have produced iron ore from the Mesabi Range for more than 100 years and have seen cyclical production levels over time, in recent years, production was quickly curtailed when demand dropped.

Cliffs Natural Resources Inc. (Cleveland, OH) operates Hibbing Taconite Co., Northshore Mining Co., and United Taconite LLC. The company reported a total of about 8.7 Mt in pellet production in 2009, with Hibbing Taconite producing 1.7 Mt of standard pellets; Northshore Mining, about 3.1 Mt, including a small amount of sinter and concentrate; and, United Taconite Co., LLC, about 3.8 Mt, including a small amount of concentrates. The decrease in production at Hibbing Taconite started with the idling of two of three pellet lines in March, followed by a complete shutdown in May. The shutdown lasted until the first quarter of 2010. A plant shutdown from April through July at Northshore Mining led to a reduction of 2 Mt of Cliffs pellet production.

ArcelorMittal Minorca Mine Inc. (Chicago, IL) produced 1.4 Mt of flux pellets, including a minor amount of pellet chips, which was down from 2.6 Mt in 2008, because of a shutdown of operations between May and September.

In December 2008, U.S. Steel had already halted production at its Keewatin Taconite facility. This facility remained idled until late December 2009. U.S. Steel also announced plans to lay off 500 union employees, as well as 90 management employees, at its Minntac operations in early February. By August, rising demand for steel led the company to announce plans to start up one pellet production line at the Minntac plant and start an additional two lines in September, finishing the year with four of five production lines in operation. U.S. Steel, which had almost no production from its Keewatin Taconite operation in 2009, produced 7.2 Mt of flux pellets production from its Minntac operation.

Legislation and Government Programs

Permitting and Reclamation

Environmental Permitting, Review, and Reclamation.—MDNR is the responsible government agency for the environmental review of all proposed taconite, metallic mineral, and peat mining projects in Minnesota under the Minnesota Environmental Protection Act. It issues the permits to mine that establish and enforce mineland reclamation regulations at mining operations affecting over 101,000 ha (250,000 acres) of public and private lands.

Three ferrous-mining project proposals underwent MDNR environmental review and/or submitted permit to mine applications or amendments. This work involved the Mesabi Nugget plant and mine, the Keewatin Taconite plant and mine expansion, and Essar Steel Minnesota's proposed increased

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In the same vicinity, three other companies produced peat products. Premier Horticulture, Inc., leased about 202 ha (499 acres) of State and county tax-forfeited lands northwest of Cromwell. The company produced about 89,000 m^3 of spaghnum peat on approximately 125 ha (310 acres). The closure of the final 7 ha (17 acres) of its oldest mine area in 2009 brought its total area under active reclamation to 25 ha (63 acres). Sampson Farms, east of Aitkin in Aitkin County, mined on about 32 ha (78 acres) of privately held land with a production of almost 46,000 m^3 of brown moss (hypnum) peat.

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A portion of this peat product was used in product development research for remediation of streams damaged by heavy metals. Thompson Farms, northeast of Aitkin, produced 1,150 m^3 of brown moss peat from approximately 0.4 ha (1 acre), though the company leased 32 ha (80 acres).

Conrad Fafard, Inc., operated on approximately 105 ha (260 acres) of State-leased land east of Floodwood, St. Louis County, producing just under 53,600 m^3 of sphagnum peat. Hawkes Company, Inc., located northeast of Newfolden in Marshall County, mined on about 87 ha (215 acres) of private and State-leased land, producing about 16,100 m^3 of reed-sedge peat. The total area in reclamation by the company in 2009 was almost 8 ha (19 acres); an additional 60 ha (149 acres) were previously reclaimed by the company and released from the Permit to Mine program. Northwoods Organics of Minnesota, LLC (formerly Waupaca Northwoods, LLC), operated on 115 ha (285 acres) of county tax-forfeited land south of Toivola in St. Louis County, producing about 81,800 m^3 of sphagnum peat.

Berger Horticultural Products, Ltd., leased 469 ha (1,160 acres) of State-owned peatland northwest of Big Falls in the Pine Island bog of west-central Koochiching County. No production occurred in 2009. Ferweda General Contracting leased about 65 ha (160 acres) of State-owned peatland northwest of Cotton, St. Louis County. No mining took place in 2009, though a limited amount of reed-sedge product was produced using peat stockpiled by the previous operator, and research continued into use of peat mixes as absorbents.

Sand, Industrial.—The application of silica sand used for the hydraulic fracturing process drove exploration for new resources, preparations for mine expansion, and development of processing plants in Minnesota. Known sources of silica sand were mined from the quartzose lithofacies of the Cambrian Jordan Sandstone, previously known as the Van Oser Member, which crops out in numerous places in counties bordering the Minnesota River, Mississippi River, and St. Croix River. Other potential sources of silica sand include the Ordovician St. Peter Sandstone and the Cambrian Wonewoc Sandstone. Similar to construction sand and gravel mining, permitting for industrial sand operations is done by local government authorities rather than the State government.

Sand and Gravel, Construction, and Crushed Stone.—Production of construction aggregate in Minnesota remained significantly lower than in previous years. Declining levels of aggregate production continue to reflect the slowdown in new residential and commercial construction. Construction aggregate is produced in every county and is mainly used in road maintenance and construction. Permitting of crushed stone quarries and sand and gravel operations is done by local governments.

Metals

Iron Ore.—Minnesota produced about 17.4 Mt of high-grade iron ore in 2009; nearly all of the final product shipped was in the form of pellets with small quantities of chips and concentrates. Iron ore mining in the State was conducted in open pit mines along the Biwabik Iron Formation, along the Mesabi Iron Range, although a minor amount of production came from reworked tailings. Nearly all of the iron ore shipped from Minnesota in 2009 was used in blast furnaces in the United States and Canada to make pig iron and then ultimately steel.

Iron ore production was down considerably from the 39.8 Mt produced in 2008 and was the lowest level of production in Minnesota since the Great Depression. The drop in production was owing to the global financial crisis. Although operations in Minnesota have produced iron ore from the Mesabi Range for more than 100 years and have seen cyclical production levels over time, in recent years, production was quickly curtailed when demand dropped.

Cliffs Natural Resources Inc. (Cleveland, OH) operates Hibbing Taconite Co., Northshore Mining Co., and United Taconite LLC. The company reported a total of about 8.7 Mt in pellet production in 2009, with Hibbing Taconite producing 1.7 Mt of standard pellets; Northshore Mining, about 3.1 Mt, including a small amount of sinter and concentrate; and, United Taconite Co., LLC, about 3.8 Mt, including a small amount of concentrates. The decrease in production at Hibbing Taconite started with the idling of two of three pellet lines in March, followed by a complete shutdown in May. The shutdown lasted until the first quarter of 2010. A plant shutdown from April through July at Northshore Mining led to a reduction of 2 Mt of Cliffs pellet production.

ArcelorMittal Minorca Mine Inc. (Chicago, IL) produced 1.4 Mt of flux pellets, including a minor amount of pellet chips, which was down from 2.6 Mt in 2008, because of a shutdown of operations between May and September.

In December 2008, U.S. Steel had already halted production at its Keewatin Taconite facility. This facility remained idled until late December 2009. U.S. Steel also announced plans to lay off 500 union employees, as well as 90 management employees, at its Minntac operations in early February. By August, rising demand for steel led the company to announce plans to start up one pellet production line at the Minntac plant and start an additional two lines in September, finishing the year with four of five production lines in operation. U.S. Steel, which had almost no production from its Keewatin Taconite operation in 2009, produced 7.2 Mt of flux pellets production from its Minntac operation.

Legislation and Government Programs

Permitting and Reclamation

Environmental Permitting, Review, and Reclamation.—MDNR is the responsible government agency for the environmental review of all proposed taconite, metallic mineral, and peat mining projects in Minnesota under the Minnesota Environmental Protection Act. It issues the permits to mine that establish and enforce mineland reclamation regulations at mining operations affecting over 101,000 ha (250,000 acres) of public and private lands.

Three ferrous-mining project proposals underwent MDNR environmental review and/or submitted permit to mine applications or amendments. This work involved the Mesabi Nugget plant and mine, the Keewatin Taconite plant and mine expansion, and Essar Steel Minnesota's proposed increased

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mining rate and expanded furnace. In addition, a manganese extraction project near Emily, MN, was subject to environmental review. Cooperative Mineral Resources proposed collection of a bulk sample to test borehole mining of manganese from the Cuyuna Range banded iron formation.

Mineral Leasing and Royalties

The State of Minnesota owns and/or administers approximately 4.8 million ha (12 million acres) of mineral rights, and encourages environmentally sound mineral development that generates revenue for the State's citizens, schools, and counties. In 2009, mineral ownership title work was gathered by MDNR, focusing on priority areas near the Mesabi Range and other areas of the State that had nonferrous-metallic mineral potential. The Minnesota State Constitution provides MDNR with a fiduciary obligation to generate income for both the Permanent School (K–12) and Permanent University Trust Funds.

Mineral Leases.—MDNR issues and manages mineral leases and collects income from those leases. There were 123 iron ore leases in 2009, on more than 4,500 ha (more than 11,100 acres) of State land. From fiscal year (FY) 2006 to FY2009, taconite iron ore royalties provided about 95% of the State mineral income. In FY2009, active State metallic mineral exploration leases covered more than 48,100 ha (about 119,000 acres) of land, a 9% increase over the previous fiscal year.

Permanent University Trust Fund.—The Minnesota legislature created the Permanent University Trust Fund (PUTF) using mining royalties paid by taconite mining companies that mine on University Trust Land. The PUTF provides the University of Minnesota its largest endowed scholarship program. Over 20% of the University of Minnesota's new freshmen who are Minnesota residents receive an Iron Range Scholarship, with more than $2.12 million distributed in 2009. College scholarships funded from mining royalties from 1994 to 2009 totaled more than $16 million.

Permanent School Trust Fund and Mineral Potential Evaluations.—MDNR has a fiduciary responsibility to administer State mineral rights in the best interest of the Trusts that own them. As part of this responsibility, MDNR is the land administrator for the Permanent School Trust Fund and other Trust's lands and mineral rights, and completes mineral potential reviews on State land transactions. Mineral resource revenue from these Trust lands has contributed to more than 75% of the total revenue to Minnesota's Public School Trust over the last 100 years, operating as the primary revenue source.

Two projects were completed in 2009 to collect new data to identify lands with high mineral potential: a geochemical survey of gold-in-till samples and a review and assay of gold in historical drill cores.

As part of the geochemical survey, 48 till samples were collected in an area in northeastern Itasca County where the State has significant mineral holdings, but there is minimal exploration data (MDNR, 2011a). The samples were processed by a third-party independent contractor and the gold grains were counted by them. The results indicate that there are anomalously high gold grain counts in an approximately 7,800-ha (30-square-mile) area of an Archean Wawa Subprovince greenstone belt. The bedrock source of this gold is unknown.

In another project, historical drill cores were logged in an Archean Wabigoon Subprovince Greenstone belt in the International Falls area (MDNR, 2011b). It was noted that high gold content, at ore grade levels but short intervals, was found to be associated with base metals and disseminated sulfides, especially at the metamorphic transition between pyrite and pyrrhotite. MDNR has a portable x-ray fluorescence spectrometer to rapidly check the core for concentrations of gold and about 20 metals. This work was planned to continue into 2010. Some of the historical exploration data in this area, such as geophysical grids, drill hole locations, and geochemical survey sample locations, have been put into a GIS index.

Mineral Resources Research

Historical Exploration Data.—MDNR continued to enhance the usefulness and value of historical exploration data while reducing future costs to use the data. A large set of more than 6,500 lake- and stream-sediment exploration geochemical sample analyses were compiled to create one master digital data set (MDNR, 2010b). Drill-hole locations and collar information were compiled for 294 historic drill holes in Cass and Crow Wing Counties. Out of more than 16,300 drill holes listed in the State's multicounty dataset, 489 drill-hole records were updated. MDNR monthly data releases, aggregate resource maps, and many online documents pertaining to mineral research and exploration are available on the MDNR Web site (http://www.dnr.state.mn.us.). The MDNR Web site also hosts a public archive of more than 100 years of exploration data on State lands entitled "Public Access to Minerals Information" at http://minarchive.dnr.state.mn.us.

Natural Resources and Research Institute (NRRI).—Since 2000, NRRI has studied the application of taconite-mining byproducts to be used as high-quality construction aggregates. In a 2009 demonstration project, taconite obtained from Cliff Natural Resources' United Taconite mine was crushed by Laurentian Aggregate. Material was transported by rail to an articulated barge in Duluth Harbor (Zanko and Patelke, 2009). Roughly 4,500 t (5,000 short tons) was hauled 750 nautical miles to a harbor on the south shore of Chicago. This demonstration was in conjunction with ongoing research that evaluates the potential of what would otherwise be considered taconite waste rock as a high-quality aggregate. Final project results were slated for publication in 2010.

MDNR Construction Aggregate Resources Mapping Program.—In accordance with State Law (Minn. Statue 84.94), MDNR continued to produce construction aggregate resource maps and GIS datasets, as well as continued collaborative efforts with State agencies and local government to identify future aggregate resource supply issues. As of January 2010, work on 23 counties was completed, and two counties—Aitkin and Stearns—were in progress. A major report, compiled by MDNR, the Metropolitan Council, and the Minnesota Geological Survey, on the aggregate resources of the Seven-County Metropolitan Area, including the cities of Minneapolis

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and St. Paul, was released in May 2009. An aggregate resource and geotechnical materials inventory near copper-nickel deposits was planned to begin in 2009. The project addresses an anticipated need for land-use planning associated with new mine development in portions of Lake and St. Louis Counties. Additionally, eight other counties via county board resolution requested construction aggregate resource maps with data.

Land-use restrictions due to conservation easements in addition to developmental pressures had been identified by MDNR as having the greatest impact to reduce the local availability of construction aggregate resources. MDNR reported that projected high population growth over the next 25 years could occur in rural counties of central Minnesota that currently have abundant supplies of high-quality construction aggregate. Conservation easements target large land tracts that can exceed almost 21,000 ha (80 square miles or 51,000 acres). MDNR collaborated with the Minnseota Department of Transportation, County Highway Engineers, and other interest groups to address the issue by proposing to prioritize the inventorying of construction aggregate for 12 key counties. Work will begin in 2010 with the mapping construction aggregate of Kanabec County and continued outreach to communities working on integrating aggregate resources in local land-use planning, to maintain future local supplies of aggregates.

Iron Ore Cooperative Research Program.—The Iron Ore Cooperative Research Program, created by the State legislature, was used to assist the Minnesota taconite industry by providing funds for taconite research projects. The program was appropriated $950,000 for 2008–09, which was matched by $475,000 in private grants from the taconite industry. A committee consisting of taconite mining company metallurgists, research scientists, and MDNR engineers determined the research priorities. The funded research projects were usually performed in Minnesota research laboratories and pilot-plant facilities. The program was considered very successful, with many of the funded research projects resulting in improved product quality and reduced production costs.

Minerals Coordinating Committee.—The Minerals Coordinating Committee (MCC) was established in 1987 by the State legislature as part of the minerals diversification plan. The MCC is composed of representatives from the minerals industry, labor, State agencies, and university research organizations. The committee was appropriated $350,000 for 2008–09 to fund mineral research projects. The goal is to fund research projects that increase the knowledge of the State's mineral potential, stimulate the development of mineral resources in the State, and promote basic mineral research. The program's success resulted in increased interest in exploration and development of Minnesota's copper-nickel resources by mining companies such as Duluth Metals, Twin Metals, Encampment Minerals, Franconia Minerals Co., Kennecott Minerals, PolyMet Mining, Prime Meridian Resources Corp., and Teck-Cominco Ltd. Funding from this program is also used to identify Minnesota aggregate resources, which aids county land-use planning agencies.

Environmental Research.—The State legislature established a Cooperative Environmental Research Fund to address environmental issues resulting from mining. The fund is administered by the MDNR, and $172,000 was appropriated for 2008–09. Research or demonstration projects are done in each of the State's mining sectors (ferrous, industrial minerals, and nonferrous), and projects require a match by non-State funds. The overall goal of the program is to develop and demonstrate new and cost-efficient reclamation techniques applicable to Minnesota's mining industry. Results and techniques developed from this program have been implemented by the mining industry to improve mine development and closure techniques, to improve reclamation procedures, and to control environmental impacts. Research in 2009 focused on mercury control technologies at taconite processing plants.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MINNESOTA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	6	NA	7	NA	7
Iron ore, usable shipped	38,800	W	41,100	W	18,700	W
Peat	41	4,350	48	4,540	44	2,850
Sand and gravel, construction	47,000 r	242,000 r	34,700 r	227,000 r	30,800	188,000
Stone:						
Crushed	10,400	111,000	10,300 r	122,000 r	8,670	110,000
Dimension	28	14,400	31	17,200	25	16,700
Combined values of clays [common (2007–08)], lime, sand and gravel (industrial), and values indicated by symbol W	XX	2,410,000	XX	3,090,000	XX	1,830,000
Total	XX	2,790,000 r	XX	3,460,000 r	XX	2,150,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MINNESOTA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	46 r	2,990 r	$33,400 r	39	2,720	$33,200
Dolomite	4	2,130	27,300	3	1,600	22,400
Granite	7	3,010	31,500	7	2,640	32,400
Sandstone and quartzite	3	2,110	28,600	3	1,570	21,000
Miscellaneous stone	4 r	97 r	785 r	8	131	1,330
Total	XX	10,300 r	122,000 r	XX	8,670	110,000

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
MINNESOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	35	860
Filter stone	W	W
Other coarse aggregate	68	1,300
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	635	11,800
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Other fine aggregate	260	3,500
Coarse and fine aggregates:		
Graded road base or subbase	388	3,920
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	419	4,260
Other construction materials	9	85
Agricultural:		
Limestone	W	W
Poultry grit and mineral food	W	W
Other miscellaneous uses and specified uses not listed	1,320	18,200
Unspecified:[2]		
Reported	3,660	44,600
Estimated	1,290	15,300
Total	8,670	110,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

MINNESOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	--	--	--	--	W	W	W	W
Coarse aggregate, graded[3]	--	--	--	--	W	W	W	W
Fine aggregate (-⅜ inch)[4]	--	--	--	--	W	W	W	W
Coarse and fine aggregates[5]	--	--	--	--	W	W	W	W
Other construction materials	--	--	--	--	--	--	--	--
Agricultural[6]	--	--	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	--	--	--	--
Unspecified:[7]								
Reported	--	--	--	--	1,220	14,900	1,710	21,000
Estimated	13	164	4	51	291	3,580	--	--
Total	13	164	4	51	1,660	20,100	2,080	25,200

Use	District 5		District 6		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	--	--	--	--
Coarse aggregate, graded[3]	W	W	--	--	--	--
Fine aggregate (-⅜ inch)[4]	W	W	--	--	--	--
Coarse and fine aggregates[5]	W	W	--	--	--	--
Other construction materials	9	85	--	--	--	--
Agricultural[6]	W	W	--	--	--	--
Other miscellaneous uses	--	--	1,320	18,200	--	--
Unspecified:[7]						
Reported	395	4,500	287	3,560	57	644
Estimated	40	496	753	9,210	185	1,810
Total	2,300	31,300	2,360	31,000	242	2,450

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, terrazzo and exposed aggregate, and other coarse and fine aggregates.

[6]Includes limestone and poultry grit and mineral food.

[7]Reported and estimated production without a breakdown by end use.

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TABLE 5
MINNESOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,410	$23,200	$6.80
Plaster and gunite sands	184	1,410	7.68
Concrete products (blocks, bricks, pipe, decorative, etc.)	95	943	9.93
Asphaltic concrete aggregates and other bituminous mixtures	1,420	14,900	10.49
Road base and coverings	4,570	14,700	3.22
Road stabilization (cement)	33	216	6.55
Road stabilization (lime)	53	457	8.62
Fill	1,100	4,350	3.96
Snow and ice control	68	419	6.16
Roofing granules	86	1,260	14.60
Other miscellaneous uses[2]	105	1,080	10.30
Unspecified:[3]			
Reported	6,160	53,100	8.62
Estimated	13,500	71,600	5.31
Total or average	30,800	188,000	6.10

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes filtration, golf course, and railroad ballast.
[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

MINNESOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	1,230	9,430	608	3,710	821	4,900
Asphaltic concrete aggregates and road base materials[3]	1,330	5,690	159	774	1,680	4,790
Fill	256	771	47	245	170	472
Snow and ice control	9	38	7	60	14	80
Roofing granules	--	--	--	--	86	1,260
Other miscellaneous uses[4]	4	31	--	--	73	821
Unspecified:[5]						
Reported	1,440	11,700	217	488	721	11,200
Estimated	2,380	13,600	2,380	13,400	4,400	19,900
Total	6,640	41,300	3,420	18,700	7,970	43,400
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	435	2,930	285	2,340	63	596
Asphaltic concrete aggregates and road base materials[3]	1,090	10,400	W	W	W	W
Fill	135	419	419	2,250	73	193
Snow and ice control	3	21	W	W	W	W
Roofing granules	--	--	--	--	--	--
Other miscellaneous uses[4]	15	106	539	5,130	231	1,460
Unspecified:[5]						
Reported	398	2,250	1,280	13,400	502	2,550
Estimated	1,250	7,210	1,730	9,900	1,340	7,530
Total	3,320	23,300	4,250	33,100	2,210	12,300
	Unspecified districts					
	Quantity	Value				
Concrete aggregate and concrete products[2]	245	1,660				
Plaster and gunite sands	--	--				
Asphaltic concrete aggregates and road base materials[3]	1,100	2,390				
Fill	--	--				
Snow and ice control	--	--				
Roofing granules	--	--				
Other miscellaneous uses[4]	--	--				
Unspecified:[5]						
Reported	1,610	11,600				
Estimated	--	--				
Total	2,960	15,600				

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration, golf course, and railroad ballast.

[5]Reported and estimated production without a breakdown by end use.

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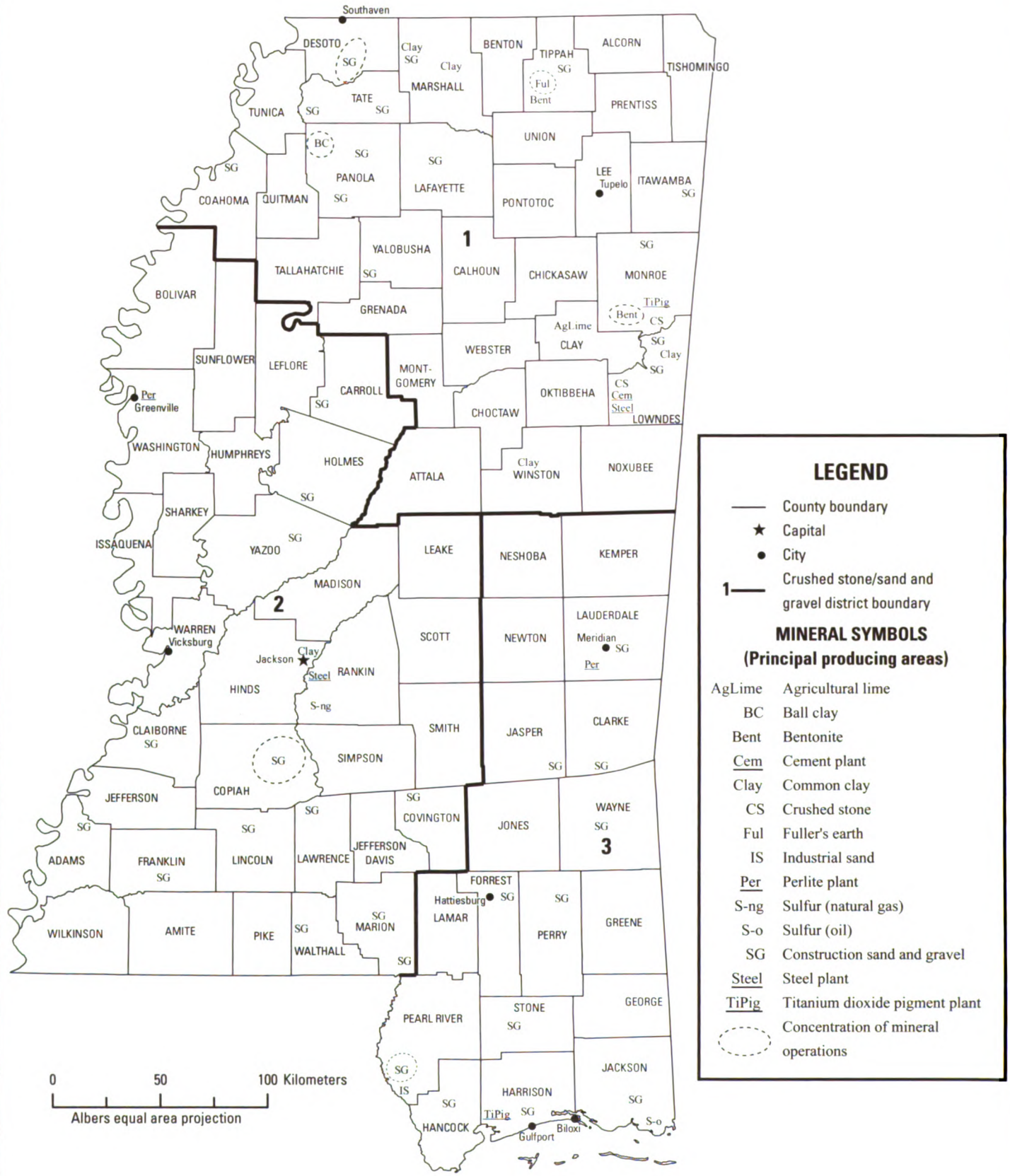

LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

AgLime	Agricultural lime
BC	Ball clay
Bent	Bentonite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Ful	Fuller's earth
IS	Industrial sand
Per	Perlite plant
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
SG	Construction sand and gravel
Steel	Steel plant
TiPig	Titanium dioxide pigment plant
⬭	Concentration of mineral operations

Source: Mississippi Department of Environmental Quality/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MISSISSIPPI

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Mississippi Department of Environmental Quality, Office of Geology, for collecting information on all nonfuel minerals.

In 2009, Mississippi's nonfuel raw mineral production[1] was valued at $208 million, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of $55 million, or almost 21%, from the State's total nonfuel mineral production value for 2008 of $263 million, which followed an $18 million, or 7%, increase from the production value total of $245 million in 2007. Mississippi decreased in rank to 42d from 38th among the 50 States for total nonfuel mineral production value, accounting for less than one-half of 1 percent of the total U.S. nonfuel mineral production value of $59 billion in 2009.

Construction sand and gravel continued to be Mississippi's leading nonfuel mineral in 2009, based upon production value, accounting for 49% of the State's total nonfuel mineral production value, up significantly from 35% in 2008 and from 42% in 2007. Crushed stone remained the State's second leading mineral commodity, accounting for 30% of the State's total nonfuel mineral production value, down from 34% in 2008 but remaining up from 24% in 2007. Both of these commodities accounted for 79% of the State's total, up significantly from 68% in 2008. These two commodities were followed by fuller's earth (montmorillonite), ball clay, and portland cement (actual values for all withheld—company proprietary data).

In 2009, the only mineral commodity to increase in production value was construction sand and gravel, up $9.6 million, from a total of $91.4 million in 2008 to $101 million. Production remained almost constant, down by only 100,000 metric tons from 12.8 million metric tons (Mt) in 2008. Production remained significantly lower compared to the total of 15 Mt in 2007. However, the increase in the value of construction sand and gravel was more than offset by the significant decreases in the production values of other mineral commodities produced in the State. Crushed stone was down $25.4 million with a 1.25-Mt decrease in production from 2008 to 2009.

Mississippi continued to be third out of the five ball clay-producing States and sixth out of the 11 bentonite clay-producing States. Additionally, the State continued to be a producer of significant quantities of construction sand and gravel, increasing in rank from 28th to 24th. Metals produced, especially raw steel, were processed from raw materials (including scrap) received from other domestic and foreign sources. Steel was produced at facilities near Jackson in Rankin County and also in Lowndes County in the eastern portion of the State.

Titanium pigments were produced at the DeLisle plant in Harrison County, owned and operated by E.I. du Pont de Nemours and Co. In January 2009, the other titanium pigment producer in the State, Tronox Inc. (formerly a subsidiary of Kerr-McGee Corp.) filed for reorganization relief with the United States Bankruptcy Court for the Southern District of New York (Tronox Inc., 2011).

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MISSISSIPPI[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Clays:						
Bentonite	67	4,610	53	3,690	W	W
Common	508	2,980	433	2,340	263	1,540
Fuller's earth	W	W	384	W	W	W
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel, construction	15,000	102,000	12,800 r	91,400 r	12,700	101,000
Stone, crushed	3,120	58,900	4,380	88,800	3,130	63,400
Combined values of cement (portland), clays (ball), lime (2007), sand and gravel (industrial), and values indicated by symbol W	XX	76,900	XX	77,200	XX	42,200
Total	XX	245,000	XX	263,000 r	XX	208,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicabl
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
MISSISSIPPI: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	5	3,920	$83,100	4	3,080	$62,700
Miscellaneous stone	3	460	5,730	2	45	664
Total	XX	4,380	88,800	XX	3,130	63,400

XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MISSISSIPPI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch), other	W	W
Coarse aggregate, graded:		
Railroad ballast	W	W
Other graded coarse aggregate	W	W
Fine aggregate (-⅜ inch), other	W	W
Coarse and fine aggregates, other	W	W
Agricultural:		
Limestone	W	W
Other agricultural uses	W	W
Chemical and metallurgical, sulfur oxide removal	W	W
Unspecified:[2]		
Reported	569	13,300
Estimated	245	2,560
Total	3,130	63,400

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
MISSISSIPPI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	--	--	W	W	18	345
Coarse aggregate, graded[3]	W	W	--	--	W	W	462	3,570
Fine aggregate (-⅜ inch)[4]	--	--	--	--	W	W	--	--
Coarse and fine aggregate[5]	W	W	W	W	W	W	14	103
Agricultural[6]	W	W	--	--	W	W	--	--
Chemical and metallurgical[7]	W	W	--	--	--	--	--	--
Unspecified:[8]								
Reported	346	7,950	W	W	--	--	--	--
Estimated	245	2,560	--	--	--	--	--	--
Total	876	14,700	259	5,790	1,500	38,900	494	4,010

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes other coarse aggregate.

[3]Includes railroad ballast and other graded coarse aggregate.

[4]Includes other fine aggregate.

[5]Includes other coarse and fine aggregates.

[6]Includes limestone and other agricultural uses.

[7]Includes sulfur oxide removal.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
MISSISSIPPI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)[2]	2,930	$23,800	$8.14
Asphaltic concrete aggregates and other bituminous mixtures	778	8,130	10.44
Road base and coverings	162	1,620	10.00
Road stabilization (lime)	21	68	3.24
Other miscellaneous uses[3]	326	887	2.72
Unspecified:[4]			
Reported	1,730	13,100	7.57
Estimated	6,730	53,400	7.94
Total or average	12,700	101,000	7.97

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes fill and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

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TABLE 6

MISSISSIPPI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	770	5,710	1,520	13,700	631	4,410
Asphaltic concrete aggregates and road base materials[3]	145	1,410	726	7,500	90	905
Other miscellaneous uses[4]	88	249	126	429	112	208
Unspecified:[5]						
Reported	1,450	10,900	7	28	270	2,120
Estimated	1,110	9,230	3,030	23,800	2,590	20,400
Total	3,570	27,500	5,410	45,500	3,690	28,000

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes fill and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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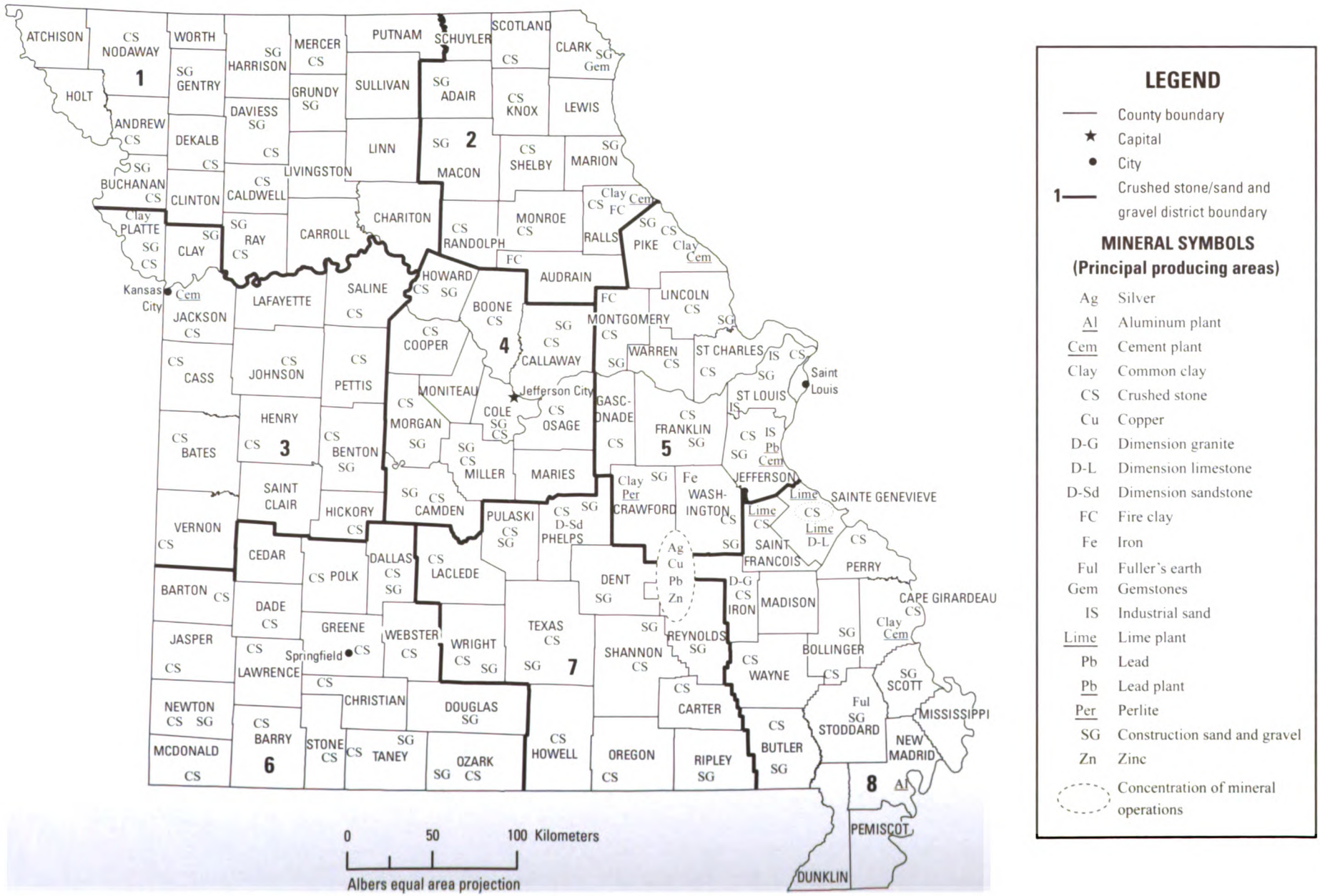

Source: Missouri Department of Natural Resources, Division of Geology and Land Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MISSOURI

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Missouri Department of Natural Resources, Division of Geology and Land Survey for collecting information on all nonfuel minerals.

In 2009, Missouri's nonfuel raw mineral production[1] was valued at $1.81 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $250 million, or 12%, decrease from the State's total nonfuel mineral production value of $2.06 billion for 2008, which followed a $220 million, or a nearly 10%, decrease from 2007 to 2008. For the third consecutive year, the State remained ninth among the 50 States in total nonfuel mineral production value and accounted for about 3% of the U.S. total of $59 billion. The top four mineral commodities in the State were crushed stone, portland cement, lead, and lime, in descending order of production value. Crushed stone and portland cement accounted for 57% of the State's total nonfuel mineral value.

In 2009, only three mineral commodities produced in Missouri increased in production value—industrial sand and gravel, up by $7.6 million, fuller's earth, and gemstones (actual data withheld for both—company proprietary data), in descending order of increase. All other mineral commodities decreased in production value, led by decreases in lead and copper (actual data withheld for both—company proprietary data), and portland cement, down by $17 million.

In 2009, industrial sand and gravel increased by 115,000 metric tons (t), or 18%, in production quantity. The only other mineral commodities to increase in production quantity were fire clay and fuller's earth. There was no significant change in the quantity of dimension stone produced between 2008 and 2009. All other commodities produced in the State decreased in production quantity, including crushed stone, down by 8.7 million metric tons (Mt), or 11%; construction sand and gravel, down by 900,000 t, or 7%; and portland cement down by 233,000 t, or 5%.

Missouri continued to lead the Nation in the production of fire clay and lime, among 6 and 33 producing States, respectively. This is the 14th consecutive year Missouri has led the Nation in quantity of lime produced. The State remained 2d in fuller's earth, 3d in crushed stone, and 12th in masonry cement. The State rose to 2d from 4th in zinc, to 3d from 6th in portland cement, and to 13th from 17th in industrial sand and gravel. The State rose to 19th from 22d in gemstones (based on production value). The State ranked among the top 30 producing States for construction sand and gravel among 50 producing States. Lead was the only commodity that declined in rank, to second from first, among five producing States. Missouri had continuously ranked first in the production quantity of lead since 1907, except briefly when it ranked second in 1962 owing to a labor strike (Diamond and Hayes, 1963, p. 613; Thom, 1909, p. 39–47). Alaska was the top lead-producing State in 2009.

The Missouri Department of Natural Resources, Division of Geology and Land Survey[2] (DGLS), provided the following narrative information. Some data or information as reported by the DGLS may differ from USGS estimates and production figures. Production tonnages, as reported by mineral facilities to the Missouri Division of Labor Standards, are summarized to avoid disclosing information that may be considered proprietary by the individual companies.

Commodity Review

Industrial minerals

Cement.—Production of portland cement in Missouri took place at six plants. Buzzi Unicem USA Inc. (Bethlehem, PA) operated its River Cement (Selma) plant, south of Festus, Jefferson County, and its plant near Cape Girardeau, Cape Girardeau County. Continental Cement Co. LLC (Chesterfield, MO) operated the Hannibal plant, Ralls County. Holcim (US) Inc. (Waltham, MA) briefly operated its Clarksville plant, Pike County, which permanently closed in the early part of the year. In August, Holcim opened the 4-million-metric-ton-per-year Ste. Genevieve plant north of Ste. Genevieve, Ste. Genevieve County (Associated Press, 2008). Lafarge North America Inc. (Chicago, IL) operated the Sugar Creek plant, Jackson County, on the Missouri River just east of Kansas City.

Clay and Shale.—Twelve companies reported a total of 1.1 Mt of clay production to the State. Production included fire clay and fuller's earth. Nestle Purina Petcare Co. in Stoddard County was the leading clay producer. Four companies produced a total of 400,000 t of shale, most of which was mined and used by Continental Cement and Holcim in the production of portland cement. Buildex Inc. (Ottawa, KS) continued to produce haydite from the Weston Shale in Platte County, just northwest of Kansas City. Ceramo Co. (Jackson, MO) stopped producing shale in southeastern Missouri and Holcim stopped producing shale for its Clarkesville cement plant early in the year.

Lime.—Lhoist North America (Fort Worth, TX; formerly Chemical Lime Co.) and Mississippi Lime Co. (St. Louis, MO) continued to produce quicklime and hydrated lime at their lime plants in Ste. Genevieve County in southeastern Missouri.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at http://minerals.usgs.gov/minerals.

[2]Patrick S. Mulvany, Geologist and Chief, Industrial Minerals Unit, authored the text of the State mineral industry information provided by the Missouri Department of Natural Resources, Division of Geology and Land Survey.

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Sand and Gravel, Construction.—Construction sand and gravel continued to be extracted from rivers, streams, and flood plains over much of the State. The material from south of the Missouri River had high chert content.

Sand, Silica.—Four companies produced high-quality quartz sandstone from the St. Peter Sandstone—Buzzi Unicem, in Jefferson County; Proppant Specialists LLC (Brandy, TX), in Perry County; Unimin Corp. (New Canaan, CT), in Jefferson County; and U.S. Silica Co. (Frederick, MD), in St. Louis County. The total production reported to the State was 800,000 t. Proppant Specialists produced 40–70-mesh hydraulic-fracture sand size that was used by the oil and gas well-servicing industry as a propping agent in shale formations.

Stone, Crushed.—SGI Granules Inc. (Hagerstown, MD; formerly ISP Minerals Inc.) and CertainTeed Corp. (Valley Forge, PA) produced crushed rhyolite roofing granules from their mines and processing facilities in Iron and Wayne Counties, respectively. Graniteville Quarry LLC (Ironton, MO) produced crushed granite in Iron County. Dillon Llewellyn LLC and Iron Mountain Trap Rock Co. (Maryland Heights, MO; a subsidiary of Fred Weber, Inc.) produced a dark-colored, crushed rhyolite in Iron and St. Francois Counties, respectively. This dark-colored rhyolite was known as "trap rock" in the industry. Crushed limestone (including dolomite) was produced at surface mines throughout most of the State. Underground mining of crushed limestone and some crushed dolomite took place in Clay, Greene, Jackson, Jasper, Platte, Stone, and Taney Counties. In addition to creating aggregate, some mines were then planned to be used as underground storage space.

Stone, Dimension.—Missouri Red Quarries Inc. produced granitic dimension stone in Iron County. Dimension stone from dolomite, limestone, and sandstone was produced at several locations in the State.

Metals

Copper, Lead, Silver, and Zinc.—Production of copper, lead, silver, and zinc came entirely from underground mines operated by Doe Run Resources Corp. (St. Louis, MO) in the Viburnum Trend Subdistrict of the Southeast Missouri Lead District, encompassing Crawford, Dent, Iron, Reynolds, and Shannon Counties. Total combined production of copper, lead, and zinc concentrates reported to the State was about 300,000 t. Lead concentrate accounted for the majority of this total. Doe Run's primary smelter in Herculaneum, Jefferson County, continued to operate. An unknown amount of silver was recovered as a byproduct of the smelting process. The company's Glover smelter, in Iron County, remained on care-and-maintenance status. Doe Run's Buick Resource Recycling Division continued to operate its lead recycling plant near the town of Boss, Dent County (Doe Run Resources Corp., 2009, p. 3–4).

Iron Ore.—Wings Enterprise Inc. continued to process iron ore tailings at the Pea Ridge Mine in Washington County into a small amount of magnetite-hematite concentrates. The mine was abandoned in 2000, and no announcement was made to reopen it.

Government Programs and Activities

In July, the DGLS participated in the Missouri Minerals Education Foundation week-long teachers' workshop that was held at William Jewell College in Liberty, Clay County. The DGLS also participated in several other educational outreach opportunities by giving talks and demonstrations to primary and secondary school students and to youth groups.

Late in the year, the DGLS finished compiling all of its previously published paper issues of "Bibliography of the Geology of Missouri" into a searchable digital database. This database can be found at http://dnr.mo.gov/asp/dgls/bibliography/search.asp.

The State continued to be a participant in the STATEMAP Program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. The DGLS continued to make geologic and 7.5-minute quadrangle maps in the Fulton project area, in Callaway County, as part of the STATEMAP program. The Missouri Department of Transportation provided rigs and crews that drilled holes in the project area in support of creating the surficial geologic maps.

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN MISSOURI[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	5,230	515,000 e	4,650	451,000 e	4,420	434,000 e
Clays, common	426	2,880	496	3,470	421	3,020
Sand and gravel:						
Construction	14,300 r	78,500 r	12,400 r	76,200 r	11,500	71,900
Industrial	642	19,400	648	21,400	763	28,900
Stone, crushed	83,900	630,000	76,400 r	614,000 r	67,700	598,000
Combined values of cadmium (byproduct from zinc concentrates), cement (masonry), clays (fire, fuller's earth), copper, gemstones (natural), lead, lime, silver, stone (dimension, granite), zinc	XX	1,040,000	XX	892,000 r	XX	672,000
Total	XX	2,280,000	XX	2,060,000	XX	1,810,000

eEstimated. rRevised. XX not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2

MISSOURI: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	212 r	69,800 r	$462,000 r	201	61,800	$460,000
Dolomite	17	2,400	16,200	20	2,350	17,100
Granite	3	1,380	111,000	3	1,200	101,000
Traprock	2 r	2,550 r	19,900 r	2	2,160	15,800
Miscellaneous stone	5 r	294 r	4,810 r	4	259	3,830
Total	XX	76,400 r	614,000 r	XX	67,700	598,000

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	194	1,570
Riprap and jetty stone	2,070	16,500
Filter stone	262	2,640
Other coarse aggregate	727	4,910
Coarse aggregate, graded:		
Concrete aggregate, coarse	1,800	15,900
Bituminous aggregate, coarse	437	3,900
Bituminous surface-treatment aggregate	36	397
Railroad ballast	450	2,970
Other graded coarse aggregate	324	2,350
Fine aggregate (-⅜ inch):		
Stone sand, concrete	54	543
Stone sand, bituminous mix or seal	12	75
Screening, undesignated	265	790
Other fine aggregate	315	3,220
Coarse and fine aggregates:		
Graded road base or subbase	3,530	21,000
Unpaved road surfacing	1,620	12,900
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	445	2,560
Roofing granules	W	W
Other coarse and fine aggregates	458	2,670
Other construction materials	59	469
Agricultural, limestone	548	2,750
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Special, asphalt fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	2	13
Unspecified:[2]		
Reported	7,050	54,700
Estimated	41,000	319,000
Total	67,700	598,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	190	1,570	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W	W	W
Coarse and fine aggregates[5]	W	W	320	2,510	384	2,530	192	1,440
Other construction materials	--	--	--	--	--	--	--	--
Agricultural[6]	W	W	W	W	W	W	W	W
Chemical and metallurgical[7]	W	W	W	W	--	--	--	--
Special[8]	--	--	--	--	W	W	--	--
Other miscellaneous uses	--	--	--	--	--	--	--	--
Unspecified:[9]								
Reported	144	1,140	356	3,070	2,900	22,900	857	5,950
Estimated	2,270	18,800	1,180	9,620	5,410	37,800	4,250	33,900
Total	3,490	32,200	3,660	25,200	9,240	67,400	5,410	42,100

Use	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	499	3,566	W	W	W	W	W	W
Coarse aggregate, graded[3]	434	3,295	709	6,556	W	W	1,171	7,613
Fine aggregate (-⅜ inch)[4]	133	325	W	W	W	W	W	W
Coarse and fine aggregates[5]	1,352	7,767	676	4,133	W	W	W	W
Other construction materials	18	85	40	385	--	--	--	--
Agricultural[6]	W	W	161	864	W	W	W	W
Chemical and metallurgical[7]	W	W	--	--	--	--	W	W
Special[8]	--	--	--	--	--	--	W	W
Other miscellaneous uses	2	13	--	--	--	--	--	--
Unspecified:[9]								
Reported	838	7,217	171	1,187	--	--	1,783	13,319
Estimated	7,865	54,397	7,343	61,861	1,613	12,841	11,121	89,982
Total	12,168	81,521	9,299	76,622	2,012	15,344	22,211	254,969

Use	Unspecified districts	
	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch)[2]	21	219
Coarse aggregate, graded[3]	98	1,310
Fine aggregate (-⅜ inch)[4]	9	129
Coarse and fine aggregates[5]	125	1,270
Other construction materials	--	--
Agricultural[6]	--	--
Chemical and metallurgical[7]	15	130
Special[8]	--	--
Other miscellaneous uses	--	--
Unspecified:[9]		
Reported	--	--
Estimated	--	--
Total	268	3,060

See footnotes at end of table.

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TABLE 4—Continued

MISSOURI: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement and lime manufacture.

[8]Includes asphalt fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

TABLE 5

MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,260	$32,100	$6.10
Plaster and gunite sands	79	545	6.90
Concrete products (blocks, bricks, pipe, decorative, etc.)	290	2,130	7.36
Asphaltic concrete aggregates and other bituminous mixtures	241	1,780	7.38
Road base and coverings	35	269	7.69
Fill	154	808	5.25
Snow and ice control	7	42	6.00
Other miscellaneous uses[2]	17	199	11.71
Unspecified:[3]			
Reported	735	4,650	6.32
Estimated	4,670	29,400	6.30
Total or average	11,500	71,900	6.26

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes railroad ballast and roofing granules.

[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

MISSOURI: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	W	W	--	--
Asphaltic concrete aggregates and road base materials	W	W	W	W	--	--
Fill	W	W	W	W	--	--
Other miscellaneous uses[3]	3	21	1	5	--	--
Unspecified:[4]						
Reported	227	1,250	3	5	(5)	2
Estimated	372	2,380	256	1,640	1,530	9,790
Total	970	5,820	327	2,140	1,530	9,790

	District 4		District 5		District 6	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	(6)	(6)	(6)	(6)	--	--
Asphaltic concrete aggregates and road base materials	(6)	(6)	(6)	(6)	--	--
Fill	27	90	108	631	--	--
Other miscellaneous uses[3]	1,270	7,750	3,870	24,400	(5)	2
Unspecified:[4]						
Reported	499	3,300	--	--	6	38
Estimated	118	885	1,660	10,300	41	263
Total	1,910	12,000	5,640	35,300	47	302

	District 7		District 8	
Use	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	W	W
Asphaltic concrete aggregates and road base materials	W	W	W	W
Fill	W	W	--	--
Other miscellaneous uses[3]	(5)	4	--	--
Unspecified:[4]				
Reported	--	--	--	--
Estimated	417	2,660	269	1,450
Total	445	3,140	620	3,370

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes railroad ballast, roofing granules, and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

[5]Less than ½ unit.

[6]Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."

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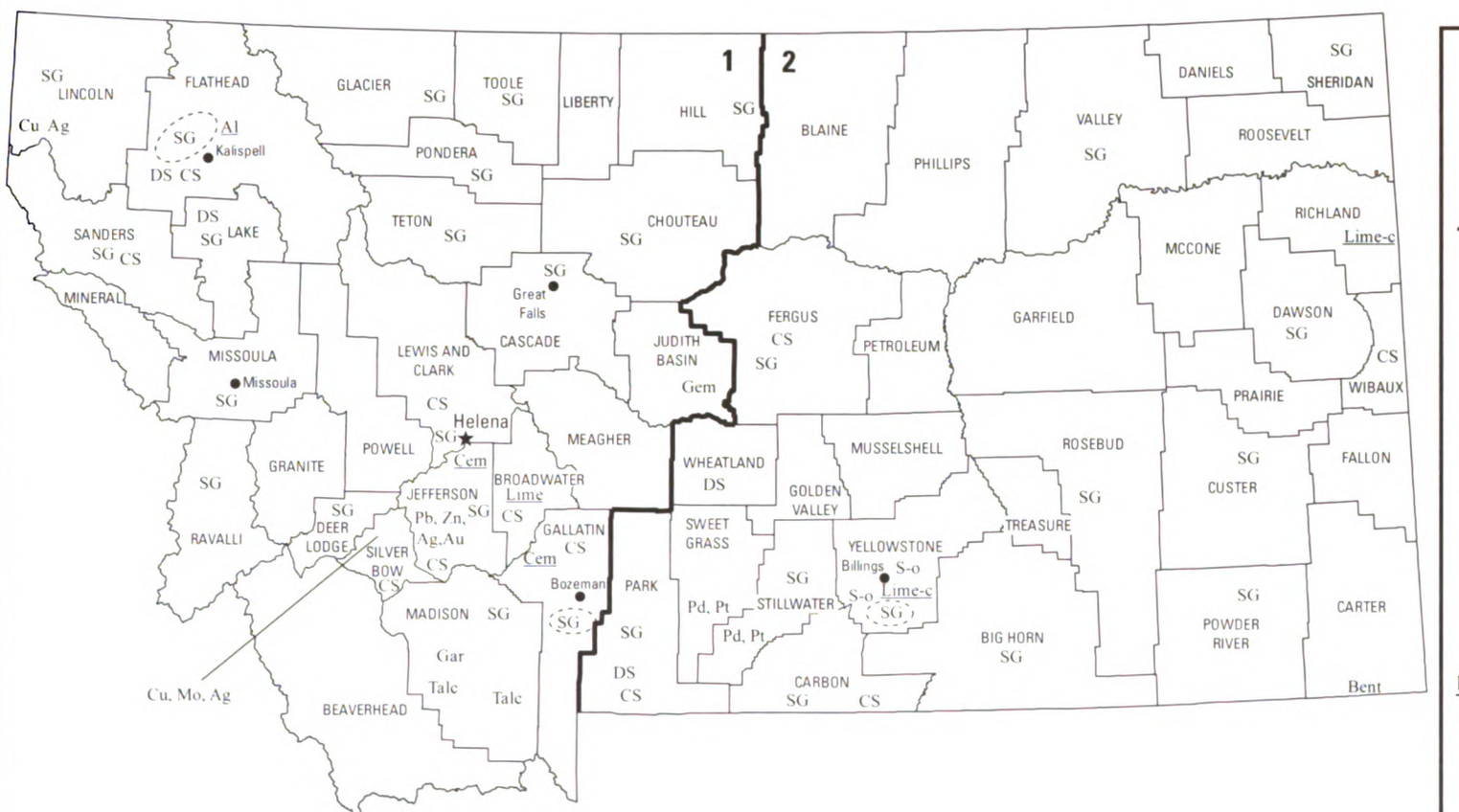
MONTANA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver
Al	Aluminum plant
Au	Gold
Bent	Bentonite
Cem	Cement plant and quarry
CS	Crushed stone
Cu	Copper
DS	Dimension stone
Gar	Garnet
Gem	Gemstones
Lime-c	Lime plant - captive
Lime	Lime plant
Mo	Molybdenum
Pb	Lead
Pd	Palladium
Pt	Platinum
S-o	Sulfur (oil)
SG	Construction sand and gravel
Talc	Talc
Zn	Zinc

Concentration of mineral operations

Source: Montana Bureau of Mines and Geology/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF MONTANA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Montana Bureau of Mines and Geology for collecting information on all nonfuel minerals.

In 2009, Montana's nonfuel raw mineral production[1] was valued at $982 million, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of $388 million, or 28%, from the production value of $1.37 billion in 2008, which had no overall change from that of 2007. The State declined to 18th in 2009 from 17th in 2007–08 in rank among the 50 States in nonfuel raw mineral production value and accounted for almost 1.7% of the U.S. total production value, down from 1.9% in 2007–08. The State remained fifth in the Nation in the per capita value of its nonfuel mineral production. With a population of about 975,000 inhabitants, the per capita production value was $1,010.

Metals accounted for 80% of Montana's total nonfuel mineral production value in 2009, down by about 3% from 2008. Molybdenum concentrates, copper, platinum, and palladium, in descending order of value, were the State's leading metallic nonfuel minerals. These metals, plus construction sand and gravel, gold, portland cement, silver, and lime (listed in descending order of value), accounted for 94% of the State's total nonfuel mineral production value.

Metals commodities decreased overall by 30% in 2009 in total production value following an increase of almost 4% in 2008. Industrial mineral commodities also decreased in total production value, falling by 17% in 2009. This decrease was preceded by a 15% decrease in 2008.

Lime, crushed stone, and bentonite clay were the only mineral commodities in the State to increase in production value. Together these mineral commodities increased by $18.9 million. The decline in Montana's total nonfuel mineral production value was led by gold, copper, and molybdenum, in descending order of production value. These three mineral commodities combined dropped by about $220 million, or 57% of the net decrease of $388 million. Other very significant decreases in production value occurred in portland cement, gold, lead, palladium, platinum, construction sand and gravel, and zinc. Smaller decreases occurred in industrial garnet, silver, dimension stone, and crude talc.

In 2009, Montana continued to be the only State to produce primary palladium and platinum. The State again ranked first in the production quantity of crude talc and industrial garnet among the three talc- and industrial garnet-producing States, fourth out of five lead-producing States, and fifth out of six cadmium-producing States (as byproduct of zinc concentrates). The State remained 5th out of 7 copper- and molybdenum-producing States, 5th out of 6 zinc-producing States, and 6th out of 11 silver-producing States. Montana rose in rank from third to second in bentonite clay. The State dropped in rank from 5th to 8th in gold, 8th to 21st in dimension stone, and ceased to produce masonry cement altogether in 2009.

Primary aluminum was produced at a facility in Flathead County. Montana ranked 9th out of 11 aluminum-producing States in 2009, an increase from 11th in 2007–08.

The Montana Bureau of Mines and Geology[2] (MBMG) provided the narrative information that follows. Production and other data in the following text are those reported by the MBMG, based on its surveys and estimates. The data may differ from some production figures reported by the USGS.

Overview

The mineral industry in Montana saw significant changes in 2009. Early in the year, the demand for and the prices of most mineral commodities remained significantly depressed by the economic downturn during 2008, and the international financial market had reduced a significant portion of funding for minerals exploration. However, prices for most metals showed a steady climb through the year, most notably for gold. The market appeared to have stabilized by the fourth quarter. The number of exploration projects in the State was significantly lower than in recent years. By yearend, funding for exploration had not recovered and only limited capital was available for projects nearing development and production. Most exploration companies that were heavily dependent on investment capital ceased to exist. Smaller mining and exploration companies that were producing were limited to cash flow and profits for capitalization. Larger mining companies were generally more stable, but most kept capital-intensive projects on hold until financial uncertainties were resolved.

Some industrial mineral companies in the international market noted recovery beginning at the end of the first quarter followed by steady growth in 2009. Local industries tied to the construction trades realized a very slow recovery. Specialty markets, such as decorative stone, were severely negatively affected by the downturn in the building construction industry. Production costs of some industrial minerals remained high because of energy prices. Portland cement sales were unchanged from the low levels of 2008.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity. All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Robin B. McCulloch, Associate Research Mining Engineer, authored the text of the State mineral industry information provided by the Montana Bureau of Mines and Geology.

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Mineral Exploration and Development

Industrial Minerals

Clays.—North of Avon, Ash Grove Cement Co. drilled a clay deposit in the Nevada Creek drainage area for clays to be used in cement manufacturing. The continuity was good but results were not yet available. The clay appeared to be hydrothermally altered volcanic ash that encapsulated gold-bearing gravel deposits.

Metals

Gold.—Exploration continued at an extremely low level despite considerable mineral endowment in Montana. Companies have found permitting slower than they would like, but still possible. However, the prevailing outside perception of gold mining in Montana was that the ban on open-pit cyanide-leaching operations in the State has made permitting a mine very difficult. On the investment side, this has left projects struggling for capital. There were 13 projects in 2009 at various levels of activity.

In the Garnet ghost town area, Grant Hartford Corp. continued drilling gold targets for a second year. The company contracted mapping of the area's geology and tested both gold placers and lode deposits. Some initial tests identified gold-bearing gravel associated with debris flows. Lode deposits were explored by almost 11,500 m of reverse-circulation drilling and a small trenching program. The program identified a resource of about 19,000 kilograms (kg) (about 611,000 troy ounces) of gold on four zones, including about 64,000 metric tons (t) (more than 70,500 short tons) of ore near the Nancy Hanks Mine; 65,300 t (72,000 short tons) of ore grading at 7.75 g/t (0.226 troy ounces per short ton) gold on the Willie vein system; 3,100 kg (99,700 troy ounces) of gold indicated and inferred in the Tostman zone; and two out of nine holes in a 1.5- to 3-m-thick (5- to 10-ft) zone ranging from 9.19 to 15.2 g/t (0.268 to 0.444 troy ounces per short ton) gold on the Tiger vein. The company is planning to continue the drilling programs in 2010 (Grant Hartford Corp., 2009).

East of Lincoln, Atna Resources, Ltd. assembled data on the Columbia (7-Up Pete) Gold Project. This property was drilled by Phelps Dodge Corp. and Western Energy Co. in the 1980s and 1990s. The gold and silver occur in veins that are up to 45 m (150 ft) wide and dip to the west. The original feasibility analysis identified open pit production rates of 2,330 kg per year (75,000 troy ounces per year) over 7.5 years. In September 2009, Atna Resources reported measured and indicated gold resources of about 15.1 million metric tons (Mt) (16.6 million short tons) grading at 1.5 g/t (0.045 troy ounces per short ton) gold, for a total of about 23,000 kg (about 742,000 troy ounces) of gold. Inferred resources totaled 9.7 Mt (10.7 million short tons) grading 1.4 g/t (0.042 troy ounces per short ton) gold totaling about 14,100 kg (about 453,000 troy ounces) of gold. The company also reported significant silver associated with the gold resource (Atna Resources Ltd., 2009). The company planned to commence feasibility studies early in the 2010 field season.

Near Virginia City, two individuals started development on a gold placer in upper Alder Gulch. Because of permitting delays, the project started up just before the first freeze in autumn. Full production was scheduled for the 2010 field season. St. Lawrence Co. drove a decline to examine drill intercepts of gold structures in Norwegian Creek. West of Dillon, Silica Resources, Inc. drilled a number of holes on the Elkhorn Mine deposit near the ghost town of Coolidge.

Near Superior, an individual purchased the southern half of the Calumet gold placer in Quartz Creek. The initial excavation defined the boundaries of the upper end of the remaining deposit. The individual indicated that production would begin in 2010.

West of Drummond, another individual excavated a few pits on a gold placer in lower Bear Gulch. Nearly all of the sites yielded gold but bedrock was not intercepted. Many of the exposures showed 3–4.5 meters (m) of topsoil. Future work was planned for the upcoming years.

Polymetallic Projects.—At Marysville, RX Exploration Inc. resumed exploration late in the summer on the historic Drumlummon Mine. Historic production from this property has totaled more than 31,000 kg (1 million troy ounces) of gold and greater amounts of silver. After securing a discharge permit for the mine water, the company contracted CDM, Inc. to design and build a water treatment plant for dissolved arsenic. The plant was completed and installed, allowing the company to dewater while rehabilitating the number 1 shaft. Current drilling has identified a resource of more than 141,000 Mt (about 156,000 short tons) containing almost 2,200 kg (70,700 troy ounces) of gold and about 59,400 kg (more than 1,910,000 troy ounces) of silver in the Charley vein. On the D-Block, more than 145,000 t (160,000 short tons) of rock grading 13.7 g/t (0.4 troy ounces per short ton) gold and 137 g/t (4.0 troy ounces per short ton) silver were identified by prior operators in the 1980s. Numerous preexisting stopes contained ore-grade resources as indicated on historic maps. The drilling also intercepted previously unknown mineralized structures adjacent to and beyond old workings. The company started a decline to access resources in the D-Block-Charley vein area. This development work could allow RX Exploration to gather bulk samples to complete metallurgical work. When the water is pumped below the current level, the company planned to initiate drilling to expand the known resource base for the mine (RX Exploration Inc., 2009).

South of Butte, Timberline Resources Corp. and Highland Mining, LLC entered into a joint venture in July for the Butte Highlands Project (Timberline Resources, 2009a). A decline was driven about 2,000 m (6,600 ft) toward drill intercepts below the historic Butte Highlands Mine, a gold-copper skarn. The project was initially designed to facilitate continued drilling of an identified gold resource of more than 16,000 kg (500,000 troy ounces). Approximately 10 to 15 drill stations will be developed for 120 drill holes. The joint venture planned on collecting a 9,070-t (10,000-short ton) bulk sample for metallurgical analysis. Development work was being conducted by Small Mine Development and an Amended Exploration Permit was granted by the Montana Department of Environmental Quality in August (Timberline Resources Corp., 2009b).

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South of Nye, Nevoro, Inc. was acquired by Starfield Resources Inc. (Starfield Resources Inc., 2009a). Both companies had interests in copper-nickel ore bodies. This acquisition provided Starfield Resources with access to extensive resources of both copper-nickel and chromite deposits. By yearend, Starfield Resources had not yet announced its intent on activities in the Stillwater Complex but had identified three general targets—the "A" and "B" chromitites near the top of the Ultramafic Series, the Volatile Enriched Zone at the top of the Ultramafic Series, and the potentially mineralized dunite bodies cutting the Ultramafic Series (Starfield Resources Inc., 2009b).

Commodity Review

Industrial Minerals

Cement.—Ash Grove Cement Co. maintained production at Montana City at a reduced rate compared to previous years except for a brief suspension when tremolite was identified in the pit in March. Subsequent testing of rock and air supplies showed no asbestiform minerals existed at concentrations above government standards. The company upgraded dust control systems at the coal mill. Operating again in April, operations focused heavily on cost savings, power monitoring, and efficiency studies. However, in the fall, the company announced the plant would shut down due to slow sales (Harrington, 2009). Ash Grove anticipated a spring reopening in 2010.

Near Three Forks, Holcim (US) Inc. continued steady production of portland cement. Some recovery in the market was predicted in late 2010. The permit for replacing 20% of the company's fuel needs with used tires was stalled in the Montana Department of Environmental Quality. The draft environmental impact statement (DEIS) showed no impact on the environment, but the final impact statement and record of decision had not been finalized. When initially proposed, the project could lower pollution potential at the plant while recycling all of the waste tires generated in the Montana operation.

North of White Sulphur Springs, Holcim's Black Butte Mine continued production as Montana's only iron ore mine. The ore was used in the production of portland cement.

Garnet and Tungsten.—At Alder, Ruby Valley Garnet, LLC maintained steady production of garnet from the dry placer deposit in Red Wash. Late in the fall, the company streamlined operations with a change in management and workforce reductions. The company continued to expand production. Exploration conducted during the summer delineated hard rock resources of up to 20% garnet at the head of the drainage area that already was being mined. GMA Garnet (USA) Corp. has contracted Ruby Valley Garnet's total production.

In Glen, Apex Abrasives Inc. completed the initial phase of construction of its processing plant at the former General Electric tungsten mill. The company planned to reprocess the garnet-rich tailings in the ponds to produce tungsten concentrates and garnet for water-jet cutting media. Preliminary production prior to seasonal closures produced a highly saleable product. Full production was anticipated with the spring thaw.

Lime.—Graymont Western U.S.A. maintained production of burnt lime at its plant northwest of Townsend. Demand was down during 2009 and was further negatively affected by the anticipated closure of the Smurfit Stone linerboard plant near Missoula in early 2010.

Stone, Crushed.—South of Billings, production continued at Montana Limestone Co.'s Warren quarry. The quarry produced approximately 590,000 t (650,000 short tons) per year and provided feed for the Western Sugar Cooperative, the Dakota Coal Co. burnt lime plant in Frannie, Wyoming, as well as seven various-sized limestone products ranging from rip rap to fine grind. The reserves were owned by Bighorn Limestone Co., which was jointly owned by Western Sugar Cooperative and Montana Limestone Co.

Stone, Dimension.—Within the Libby-Kalispell-Thompson Falls area, a large number of small decorative stone quarries constituted a substantial local economic influence. Most of them were located along Pritchard Formation (Super Belt Supergroup) outcrops. Products ranged from thinly bedded sheets of various stones ranging from 2.5 to 5 centimeters (cm) thick to various thicker bedded blocks (8–20 cm thick), used for dry stacking and landscaping purposes.

Most of the decorative stone products were used in the construction of high-value housing and businesses. The financial decline in 2008 in housing construction did not affect the demand as much as the anticipated 19% decrease through the early quarters of 2009. However, the slump caught up in the latter half of 2009; demand was rumored to have dropped by 50%. Inventories at many of the stone yards were full by early fall—a time when, in previous years, inventories would have been substantially reduced.

Talc.—Barretts Minerals Inc. produced a number of talc products from the Treasure and Regal Mines, located east of Dillon. One of the products was used in the production of ceramic substrate for catalytic converters. The 2008 economic decline triggered a stagnation of U.S. automotive sales, which in turn temporarily eliminated the demand for that portion of talc sales. The company was forced to reduce its workforce for most of the year, but has since rehired its production staff with the increase in sales later in the year. As with most of the mining industry, Barretts Minerals has not yet replaced support personnel. In operations, the company continued construction of new shop facilities at the Regal Mine while looking to expand reserves northeast of the mine. The exploration program yielded good results.

South of Ennis, Rio Tinto Minerals maintained talc production at its Yellowstone Mine. Following the labor reduction programs of the previous year, the company maintained labor levels while it hired a few new employees. As with many of the industrial minerals companies, the focus was on cost reduction and optimizing operations. Internal capital was in short supply throughout the industry. Rio Tinto continued to look into divesting the talc business of Rio Tinto Minerals.

Metals

Copper and Silver.—The Troy Mine, near Troy in northwestern Montana, was owned by Revett Minerals Inc. through a wholly owned subsidiary of Revett Silver Co. and operated by Genesis, Inc. In 2009, the company increased copper-silver ore production by 5% to about 3,400 t (3,700 short tons) per day. Its labor force was steady with 180

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to 185 employees. In 2009, the 10% pay cut for employees implemented late in 2008 was fully reversed. Silver production increased by 10% but copper production declined by 12%. The company continued to expand its reserves in the deeper copper-silver zones. Development of the "C" bed, located about 110 m (370 feet) below the main ore body, was planned for 2010, with production scheduled in 2011. Many of the zones contained marginally economic amounts of metal, but the company has identified blocks of economic reserves within those zones.

Revett Silver, owner of the Rock Creek copper-silver project, continued to wait for the appeals and subsequent court decisions to be resolved prior to starting development of the property. It planned to initiate the development of the upper decline in 2010 barring further lawsuits against the permitting agencies.

On the east side of the Cabinet Mountains Wilderness, Mines Management Inc. ceased rehabilitation work in their decline until permitting of the Montanore copper-silver mine was completed. The draft environmental impact statement was completed and the company was waiting for the final record of decision. The company planned to start a bankable feasibility study near the end of 2009 (Mines Management Inc., 2009a, b).

Gold.—Across the State, several individuals worked placer deposits. Near Superior, two individuals produced gold from the lower Quartz Creek placer through late summer. All areas disturbed by mining operations were reclaimed after known reserves were exhausted. Near Avon, an individual briefly produced placer gold on Ophir Creek above Blackfoot City. Further exploration was planned for late fall but was delayed into 2010 owing to inclement weather. Other individuals worked in the Scratchgravel Hills north of Helena and near Helena at the Pretty Girl placer in Grizzly Gulch. The availability of process water was limited in the Scratchgravel Hills from spring to early summer. At Grizzly Gulch, most of the nuggets and flakes were crystalline and were derived from a skarn exposed at various locations throughout the drainage and surrounding area.

Near Whitehall, Barrick Gold Corp. continued stripping waste at its Golden Sunlight Mine. Development was focused on the west and northwest sides of the pit to access the remaining ore in the 5B optimized pit plan. During this 3-year stripping plan, the company overhauled equipment, expanded the truck fleet with three Cat 785 haul trucks, and rehabilitated the mill. The mill was scheduled to resume production on January 1, 2011 (Barrick Gold Corp., 2010, p. 56). The existing reserves were expected to be depleted in 2015. The company was also searching for compatible raw ore from underground properties within 161 km (100 miles) to purchase. Barrick Gold continued to explore for additional reserves from satellite ore bodies while permitting the ore deposit discovered under the crushing circuit. Preliminary work was done in anticipation of converting the mill to a gravity-flotation circuit after the ore body was exhausted, which should allow the company to reprocess the tailings to recover sulfide minerals for further gold recovery.

Platinum-Group Metals.—Stillwater Mining Co. maintained production from the largest operating mine complex in the State. Under adverse financial conditions, the company posted a net loss of $9.2 million (Stillwater Mining Co., 2010). During 2009, the company reduced staff by 27%, increased production by 6.2%, and added a second furnace at the smelter. It lost money on used catalytic converters purchased for recycling when the price for platinum-group metals declined in late 2008 and early 2009. Recovery was impaired when used catalytic converters were not available for purchase and recycling. General Motors Corp. backed out of its purchase contract via bankruptcy, which met with court approval in July (Stillwater Mining Co., 2009a, b). Because of the tough financial conditions, Stillwater took drastic cost-cutting measures that could improve its future.

At its East Boulder Mine, the company laid off the entire staff of approximately 650 people and then rehired 265 people after reevaluating its operations. Cuts were focused on management and support staff. Changes in mining methods reduced dilution and sidelined most of the fleet of diesel equipment.

At the Stillwater Mine, production increased to almost 12,300 kg (394,000 troy ounces) of platinum-group metals from 10,900 kg (349,000 troy ounces) in 2008. Stillwater reduced equipment, personnel, and dilution through changes in mining methods and were analyzing the company's business practices. The difficult financial times the company faced in 2009 were met with remarkable business tactics and survival techniques.

Other Polymetallic Mines.—At Silver Star, Coronado Resources Ltd. maintained copper and gold production at its Madison Project (formerly the Broadway-Victoria Mine). The company direct shipped copper ore and gold ore from different areas of the mine on a mining contract with Blue Range Engineering Co. Inc. Cumulative shipments since 2008 have exceeded 54.4 kg (1,750 troy ounces) of gold and 612,000 kg (1.35 million pounds) of copper. Highlights of a limited ore-definition drilling program revealed one hole intercepting 14 m (45 ft) of ore grading at 25 g/t (0.74 troy ounce per short ton) gold, 41 g/t (1.2 troy ounces per short ton) silver, and roughly 1.1% copper. A second hole intercepted 8 m (25 ft) of ore grading at almost 20 g/t (0.58 troy ounce per short ton) gold, 130 g/t (3.9 troy ounces per short ton) silver, and roughly 5.7% copper (Coronado Resources Ltd., 2009).

Apollo Gold Corp. and Elkhorn Tunnels' (a subsidiary of Elkhorn Goldfields LLC) Montana Tunnels Mine (gold, silver, lead, and zinc) remained in standby mode. Permits were granted but development capital has been difficult to raise. The open pit metals mine was located west of Jefferson City and had more than 7 years' worth of reserves remaining. It was estimated that $60 to $85 million will be necessary to complete the prestripping and environmental stipulations of the mine permit. Elkhorn Goldfields and Apollo Gold Corp. signed a letter of intent to transfer ownership to Elkhorn Goldfields.

In Butte, Montana Resources maintained steady production of copper, molybdenum, and silver. The company continued to upgrade production and support. It completed a new computer control system for the mill. Exploration on the south side of the deposit increased the reserve base, especially for molybdenum, and deeper drilling in the pit showed promising results. Employment was steady, at 345–348 people who participate in a profit-sharing program.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MONTANA[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural		NA	386	NA	380	NA	378
Palladium[3]	kilograms	12,800	148,000	11,900	136,000	12,700	108,000
Platinum[3]	do.	3,860	162,000	3,580	182,000	3,830	149,000
Sand and gravel, construction		16,000 r	135,000 r	13,400 r	110,000 r	11,200	85,500
Stone, crushed		1,810	9,800	1,980 r	14,000 r	1,990	20,400
Combined values of cadmium (byproduct from zinc concentrates), cement, clays (bentonite, common), copper, garnet (industrial), gold, lead, lime, molybdenum concentrates, silver, stone (dimension), talc (crude), zinc		XX	910,000	XX	924,000 r	XX	619,000
Total		XX	1,370,000 r	XX	1,370,000 r	XX	982,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Recoverable content of ores, etc.

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TABLE 2
MONTANA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008[r] Number of quarries	2008[r] Quantity (thousand metric tons)	2008[r] Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	3	1,480	$10,500	9	1,570	$16,600
Traprock	--	--	--	--	--	--
Sandstone and quartzite	--	--	--	--	--	--
Miscellaneous stone	27	500	3,530	33	417	3,800
Total	XX	1,980	14,000	XX	1,990	20,400

[r]Revised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Concrete aggregate (+1½ inch):		
Riprap and jetty stone	19	296
Filter stone	W	W
Coarse aggregate graded:		
Bituminous aggregate, coarse	W	W
Railroad ballast	W	W
Fine aggregate (-⅜ inch), stone sand (concrete)	W	W
Coarse and fine aggregates:		
Graded road base or subbase	W	W
Unpaved road surfacing	69	411
Crusher run or fill or waste	W	W
Chemical and metallurgical:		
Cement manufacture	583	8,030
Lime manufacture	W	W
Sulfur oxide removal	W	W
Special, mine dusting or acid water treatment	W	W
Unspecified:[2]		
Reported	48	340
Estimated	164	1,280
Total	1,990	20,400

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
MONTANA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009 BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2	
Use	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[2]	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	--	--
Coarse and fine aggregates[5]	W	W	W	W
Chemical and metallurgical[6]	W	W	W	W
Special[7]	--	--	W	W
Unspecified:[8]				
Reported	48	340	--	--
Estimated	146	1,130	19	148
Total	1,350	14,600	642	5,870

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone and riprap and jetty stone.
[3]Includes bituminous aggregate (coarse) and railroad ballast.
[4]Includes stone sand (concrete).
[5]Includes crusher run or fill or waste, graded road base or subbase, and unpaved road surfacing.
[6]Includes cement and lime manufacture and sulfur oxide removal.
[7]Includes mine dusting or acid water treatment.
[8]Reported and estimated production without a breakdown by end use.

TABLE 5
MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	790	$7,610	$9.63
Asphaltic concrete aggregates and other bituminous mixtures	331	2,390	7.21
Road base and coverings[3]	2,570	16,600	6.47
Road and other stabilization (cement)	34	254	7.47
Fill	97	505	5.21
Snow and ice control	56	521	9.30
Other miscellaneous uses[4]	30	342	11.40
Unspecified:[5]			
Reported	3,130	26,100	8.32
Estimated	4,120	31,100	7.55
Total or average	11,200	85,500	7.66

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (lime).
[4]Includes railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

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TABLE 6

MONTANA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	653	6,680	137	937	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	141	770
Road base and coverings[3]	1,640	12,300	641	2,920	324	1,650
Fill	57	417	39	88	--	--
Other miscellaneous uses[4]	268	2,430	7	50	--	--
Unspecified:[5]						
Reported	1,840	15,800	1,290	10,300	10	22
Estimated	3,000	22,700	1,120	8,430	--	--
Total	7,460	60,300	3,230	22,700	475	2,440

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes railroad ballast and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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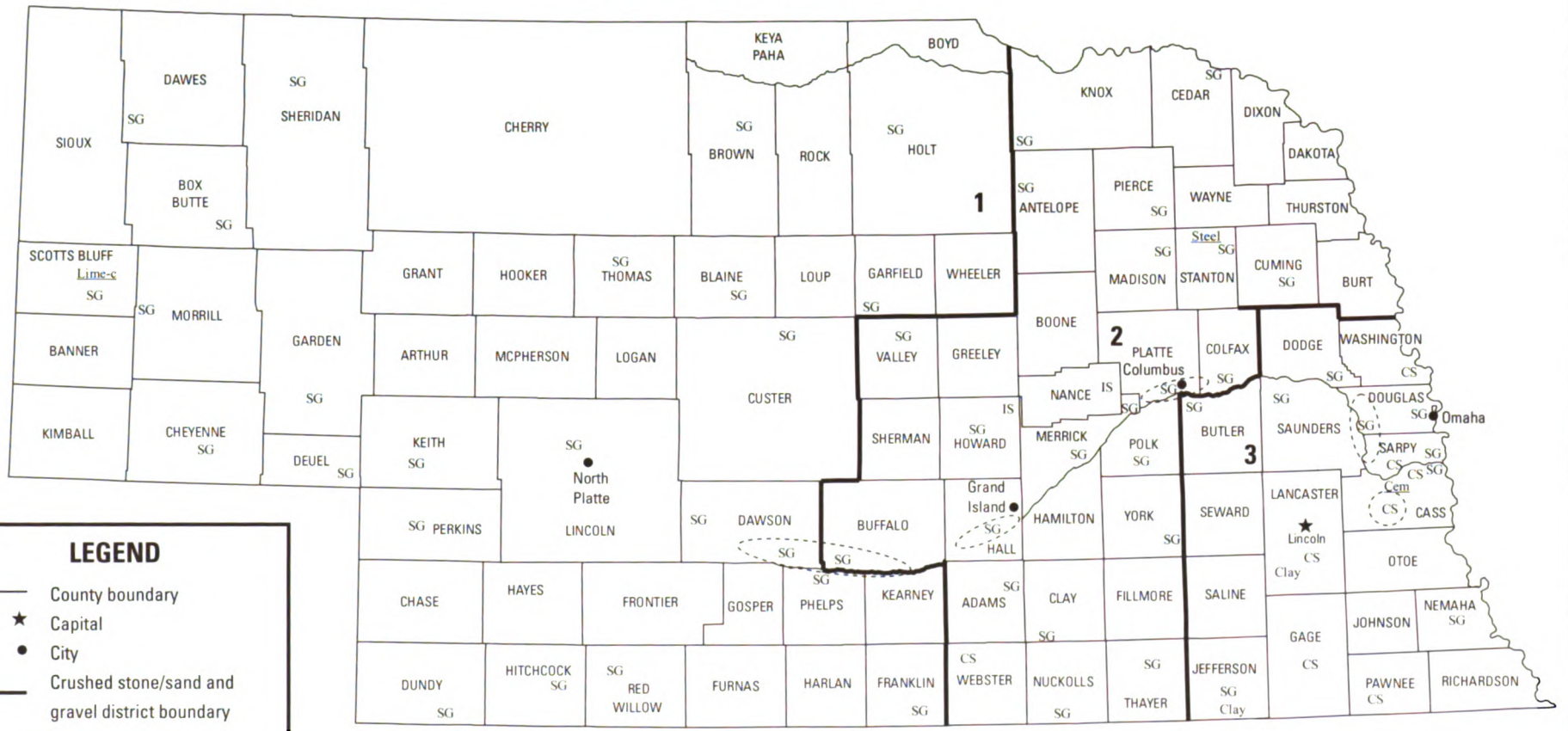
NEBRASKA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1—— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
IS	Industrial sand
Lime-c	Lime plant (captive)
SG	Construction sand and gravel
Steel	Steel plant
⬭	Concentration of mineral operations

Source: University of Nebraska-Lincoln, Nebraska Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF NEBRASKA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Nebraska Geological Survey at the University of Nebraska-Lincoln, for collecting information on all nonfuel minerals.

In 2009, Nebraska's nonfuel raw mineral production[1] was valued at $248 million, based upon annual U.S. Geological Survey (USGS) data. This was a $95 million increase from the State's total nonfuel mineral production value of $153 million in 2008. With the addition of industrial sand and gravel being reported to the USGS in 2009, this apparent increase in total nonfuel mineral production value from 2008 to 2009 was due to the inclusion of previously withheld mineral commodities in the State's total mineral production value in 2009. These mineral commodities—common clay, portland cement, masonry cement, and lime—had been previously excluded from the State's total nonfuel mineral production value to protect company proprietary data (table 1). The combined production value of the remaining mineral commodities in 2008—gemstones, construction sand and gravel, and crushed stone—decreased by a combined $18 million, or nearly 12%, in 2009. The State's total nonfuel mineral production value increased by $6.7 million, or 4.6%, from 2007 to 2008. In 2009, the State was ranked 38th among the 50 States in total nonfuel mineral production value and accounted for 0.42% of the U.S. total. Per capita, the State ranked 23d in the Nation in its mineral industry value of nonfuel mineral production; with a population of about 1.8 million, the value of production was about $138 per capita.

Portland cement, by value, continued to be Nebraska's leading nonfuel mineral commodity, followed by construction sand and gravel, crushed stone, and industrial sand and gravel. The combined values of these four commodities accounted for 99% of the State's total nonfuel mineral production value. The only significant increase in production value took place in lime (actual values withheld—company proprietary data). The largest decrease in production value took place in crushed stone, down by $18.4 million. Smaller, yet significant, decreases also took place in common clays and portland cement (actual values withheld—company proprietary data). The production value of natural gemstones remained the same as that of 2008.

In 2009, Nebraska ranked 17th in the production of industrial sand and gravel among 34 producing States. This is the first year since 2004 that Nebraska produced industrial sand and gravel. The State ranked among the top 25 producing States for construction sand and gravel and portland cement.

The following narrative information was provided by the University of Nebraska-Lincoln, Nebraska Geological Survey (NGS).[2] Production data and information in the text that follows are those reported by the NGS and are based on the agency's own surveys and estimates. These may differ from production figures published by the USGS.

Commodity Review

Industrial Minerals

Cement.—Ash Grove Cement Co. (Overland Park, KS) operated the sole cement plant in the State, located in Louisville, Cass County. Ash Grove decreased cement shipments markedly in 2009 owing to the overall economic downturn. A seasonal layoff began in late December, but a recall of employees was anticipated for the first quarter of 2010. The company celebrated its 80th anniversary in September and opened a new office building designed to meet the Environmental Protection Agency's (EPA) Energy Star Rating. A new monitoring system was also installed throughout the plant's electrical power grid, thereby reducing consumption of electricity and decreasing the operation's overall carbon footprint. Ash Grove received the first annual Business Recognition Award from the Cass County Economic Development Council in 2009 (Ash Grove Cement, 2012). The company exceeded 600 days without a lost-time accident, but reported three lost-time accidents in the second half of the year. Ash Grove will focus on improving safety in 2010.

Clay, Brick, and Tile.—Endicott Clay Products Co., Endicott Tile, LLC (Fairbury, NE) was scheduled to complete several major contracts for the following projects in 2009: Health Services Building at Yale University in New Haven, CT; sites 23 and 24 at Battery Park City in New York, NY; Oak Ridge National Laboratory in Oak Ridge, TN; and Wright-Patterson Air Force Base in Dayton, OH.

Blair Ag, LLC, located in Blair, Washington County, continued to receive shipments of attapulgite (palygorskite) from BASF Corp. in Florida for use in liquid fertilizers and livestock liquid feed supplements. The feed supplements were processed by Blair's sister company, Liquid Feed Commodities, Inc., in Fremont, Dodge County. The market for liquid fertilizers has declined, but there has been some increase in the market for the liquid feed supplements for livestock. Attapulgite is used in combination with xanthan gum as a thixotropic suspending agent in molasses-based liquid feed supplements, which Liquid Feed Commodities supplied to dealers in Colorado, Iowa, Kansas, Minnesota, Missouri, and Nebraska. For the past 2 years, Blair Ag has relied on CSX Corp. as a rail hauler out of BASF's Florida terminal, with interchange to the Union Pacific Railroad for eventual shipment to Nebraska.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook Chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov.minerals.

[2]R.M. Joeckel, Ph.D., Research Geologist and Associate Professor, authored the text of the State mineral industry information provided by the Nebraska Geological Survey at the University of Nebraska-Lincoln.

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Fly Ash.—NEBCO Inc.'s Nebraska Ash division in Lincoln used 237,000 t of fly ash in 2009, or 59.4% of the fly ash output from source power plants and 71,300 t of bottom ash, or 86.4 % of the output from source power plants—the largest percentage of output used registered since 2006. Tonnages of fly ash and bottom ash used by Nebraska Ash in 2009 represent increases of 29,900 t and 4,400 t, respectively, as compared to those of 2008. In 2009, approximately 60% of Nebraska Ash fly ash was used in concrete and approximately 40% was used in soil stabilization. Approximately 55% of bottom ash recovered was used as aggregate on farm and county roads, and the remaining 45% was incorporated as aggregate in asphaltic concrete.

Omaha Public Power District began producing electricity at the new coal-fired Nebraska City 2 (NC2) generating unit, but owing to environmental regulations, the ash produced there cannot be utilized in any industrial applications; all ash at the site was disposed of in an onsite landfill. NC2 produced 164,200 t of fly ash and 23,600 t of bottom ash in 2009.

Rare-Earth Elements.—In the last quarter of 2009, there was a renewal of interest in the subsurface Elk Creek Carbonatite (ECC) deposit in Johnson and Pawnee Counties in southeastern Nebraska as a source of light rare-earth elements (REEs). Molycorp, Inc., carried out an extensive drilling program in the area in the mid-1980s, but lease agreements were allowed to expire thereafter. By October, several companies, including Gold Canyon Resources, Inc., Puget Ventures, Inc., and Canadian International Minerals, Inc., were making preliminary inquiries about the ECC, investigating datasets, and circulating lease agreements among landowners in Johnson and Pawnee Counties. Multiple public meetings were held for the dissemination of information. Very preliminary discussions of the potential for niobium production from the ECC followed interest in the deposit's potential as a source of REEs, but no specific actions were taken during 2009. Initial discussions of the potential development of phosphate resources associated with the ECC accompanied interest in that deposit's potential as a source of REEs.

Sand and Gravel, Industrial.—Demand for Nebraska hydraulic fracturing (frac) sands began to increase in late 2009 and was projected to continue to increase into 2010. Preferred Sands of Genoa, LLC (a subsidiary of Preferred Sands LLC), which produces almost solely frac sands, began expanding its wet-process capabilities in Genoa, Nance County, approximately 120 km west of Omaha. Nebraska Sand Company, LLC, in Elba, Howard County, shut down temporarily in 2009, but operations were scheduled to start up again in the spring of 2010.

Stone, Crushed.—In June, Martin Marietta Materials Inc. (Raleigh, NC) purchased the Fort Calhoun stone operation of CEMEX Construction Materials South LLC; the Fort Calhoun operation is located in Douglas County, about 20 kilometers (km) north of Omaha. CEMEX had acquired the Fort Calhoun stone operation with its purchase of Rinker Materials Western Inc. (Raleigh, NC) in 2007. Martin Marietta also purchased operations in Wyoming and Utah (Martin Marietta Materials Inc., 2009, p. 19).

The Nebraska Department of Roads (NDOR) recycled more than 16,000 metric tons (t) of crushed concrete, mostly as base-course material and to a lesser extent as material for surface courses and in soil embedment. The NDOR initiated the use of recycled asphalt pavement (RAP) and the implementation of high-recycle asphalt mixes, thereby decreasing the demand for virgin aggregates. Average RAP use in the NDOR asphalt paving work increased from 2007 to 2009 from 7% to 27%. The NDOR also worked towards developing a new concrete mix (47BR) that is expected to use 100% local aggregates instead of the currently required 30% limestone mix. If this new mix passes testing and is implemented, it may eliminate the need to ship limestone aggregates from southeastern Nebraska to western Nebraska (Nebraska Department of Roads, 2009, p. 22).

Mineral Fuels and Related Materials

Uranium.—The new Class III Underground Injection Control Permit filed in August of 2008 by Crow Butte Resources, Inc., remained under review through 2009. The permit was filed with the Nebraska Department of Environmental Quality (NDEQ) and was intended to address Crow Butte's proposed North Trend Expansion Area. Additional information was requested from Crow Butte by the NDEQ prior to the rendering of a decision. The company's Aquifer Exemption Petition, filed simultaneously in 2008, also remained under review through 2009 (U.S. Nuclear Regulatory Commission, 2008).

Environmental Issues and Recycling

In May, officials from the EPA's Region 7 signed the Final Record of Decision regarding the Omaha Lead Superfund Site. The EPA's selected remedy for the site involved the excavation and replacement of soils that exceeded a value of 400 parts per million lead in 10,000 residential properties in an area of 7,000 hectares. The remediation was estimated to cost $237 million. In May, the EPA announced that more than $25 million from the American Recovery and Reinvestment Act of 2009 would be added to the cleanup fund (U.S. Environmental Protection Agency, 2009).

In 2009, Nucor Corp. (Charlotte, NC) employed 422 workers at its electric arc furnace plant in Norfolk, Madison County. The Norfolk plant recycled 700,000 t of scrap steel during the year and continued to invest millions of dollars in its mill's upgrades. Nucor remained a member of the Occupational Safety and Health Administration's Voluntary Protection Program. The company's annual Earth Day scrap drive yielded about 42 t of scrap steel; almost 26 t of computers, televisions, and other electronics; and 3.6 t of aluminum cans. Another company, Magnolia Metal Corp., used 90% recycled copper, bronze, tin, and lead in its casting mix at its foundry and machine shop in Auburn, Nemaha County, approximately 100 km south of Omaha.

Government Programs

The NGS, part of the University of Nebraska-Lincoln's School of Natural Resources, continued as an active participant in the STATEMAP program in 2009. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through

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which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. The Duncan, Hallam, and Obert 7.5-minute-quadrangle surficial geologic maps were completed and published in November. Sand and gravel resources exist in the area of the Duncan Quadrangle, and potential sand and gravel and agricultural lime resources from the Niobrara Formation were identified in the area of the Obert Quadrangle. Fill material from Pleistocene outwash sands was excavated near the northeastern edge of the area encompassed by the Hallam Quadrangle, and additional sand deposits exist near the land surface in the northern part of the map area.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEBRASKA[1, 2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	135 e	W	109 e	W	W	[3]
Gemstones, natural	NA	4	NA	4	NA	4
Sand and gravel, construction	13,500 r	71,100 r	14,000 r	75,400 r	12,900	75,500
Stone, crushed	7,690	75,600	7,960	78,100	6,340	59,700
Combined values of cement, lime, sand and gravel [industrial (2009)], and value indicated by footnote 3	XX	W	XX	W	XX	113,000
Total	XX	147,000 r	XX	153,000 r	XX	248,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Withheld value included in "Combined values" data.

TABLE 2
NEBRASKA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

	2008			2009		
Type	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	7	7,910	$77,700	9	6,130	$58,500
Miscellaneous stone	1	45	443	4	204	1,230
Total	XX	7,960	78,100	XX	6,340	59,700

XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
NEBRASKA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	W	W
Other coarse aggregate	14	176
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	W	W
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Screening (undesignated)	W	W
Other fine aggregate	3	37
Coarse and fine aggregates:		
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Agricultural:		
Limestone	W	W
Other agricultural uses	43	547
Special, asphalt fillers or extenders	W	W
Unspecified:[2]		
Reported	4,120	38,300
Estimated	85	811
Total	6,340	59,700

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
NEBRASKA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	872	$3,750	$4.30
Plaster and gunite sands	897	4,780	5.33
Asphaltic concrete aggregates and other bituminous mixtures	690	5,810	8.41
Road base and coverings[2]	1,840	11,600	6.31
Fill	362	1,080	2.99
Snow and ice control	51	272	5.33
Filtration	3	25	8.33
Other miscellaneous uses	17	392	23.06
Unspecified:[3]			
Reported	697	4,100	5.88
Estimated	7,450	43,700	5.87
Total or average	12,900	75,500	5.87

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (lime and cement).
[3]Reported and estimated production without a breakdown by end use.

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TABLE 5

NEBRASKA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	W	W	574	2,600	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	1,490	10,700	W	W
Fill	49	101	293	930	21	51
Snow and ice control	13	49	30	153	8	71
Other miscellaneous uses[4]	994	5,020	9	280	1,250	7,730
Unspecified:[5]						
Reported	36	183	2	28	659	3,890
Estimated	2,290	13,200	2,840	16,500	2,330	14,000
Total	3,380	18,600	5,230	31,200	4,270	25,700

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime and cement).

[4]Includes filtration.

[5]Reported and estimated production without a breakdown by end use.

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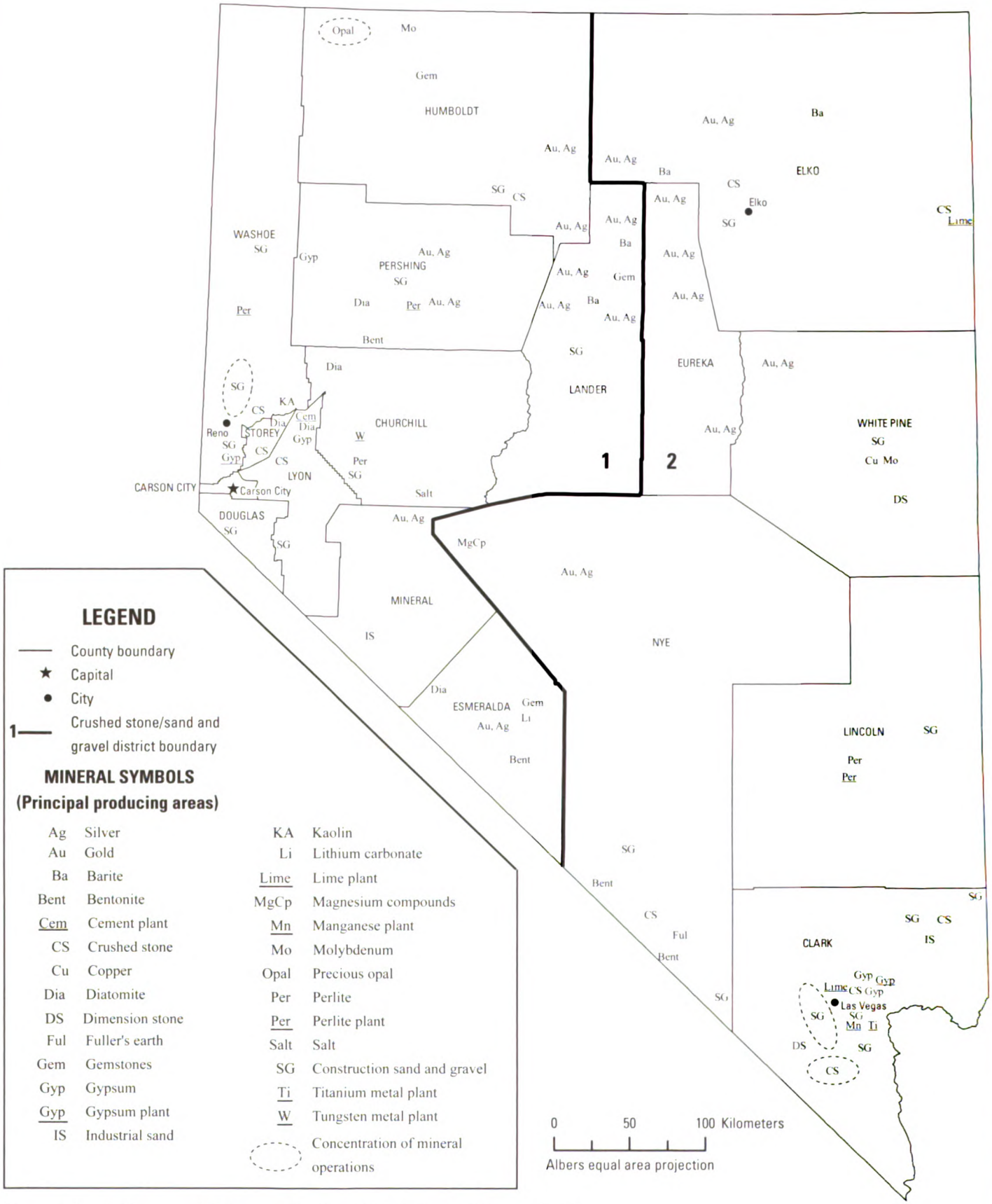
NEVADA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Ag	Silver	KA	Kaolin
Au	Gold	Li	Lithium carbonate
Ba	Barite	Lime	Lime plant
Bent	Bentonite	MgCp	Magnesium compounds
Cem	Cement plant	Mn	Manganese plant
CS	Crushed stone	Mo	Molybdenum
Cu	Copper	Opal	Precious opal
Dia	Diatomite	Per	Perlite
DS	Dimension stone	Per	Perlite plant
Ful	Fuller's earth	Salt	Salt
Gem	Gemstones	SG	Construction sand and gravel
Gyp	Gypsum	Ti	Titanium metal plant
Gyp	Gypsum plant	W	Tungsten metal plant
IS	Industrial sand		Concentration of mineral operations

Source: Nevada Bureau of Mines and Geology/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF NEVADA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Nevada Bureau of Mines and Geology for collecting information on all nonfuel minerals.

In 2009, Nevada's nonfuel raw mineral production[1] was valued at $6.02 billion, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of $268 million, or 4%, from a total production value of almost $6.29 billion in 2008, which had followed an $887 million, or 16%, increase from a total production value of $5.4 billion in 2007. The State rose in rank to first in the Nation in total nonfuel mineral production value in 2009, which followed rankings of second in 2006–2008 and third in 2005. The State was either first or second in the Nation from 1993–2004. Nevada accounted for 10.2% of the U.S. total nonfuel value in 2009.

Nevada produced 161,000 kilograms (kg) of gold, accounting for 72% of the Nation's total gold production of 223,000 kg. The State has led the Nation in gold production since 1981. Gold accounted for 84% of the State's total nonfuel raw mineral production value in 2009, followed by copper (actual data withheld—company proprietary data), construction sand and gravel, lime, silver, and crushed stone. Nevada, for the eighth consecutive year, ranked second in silver production (first from 1987–2001), accounting for 16%, or about 203,000 kg, of the Nation's total silver production—1,250,000 kg. Silver production in the State continued on a downward trend since 2000; production declined by 59% from 734,000 kg in 2000 to approximately 300,000 kg in 2004, but since then has decreased on average by 8% annually.

The largest increase in production value took place with gold, up by $43 million, or less than 1%, from that of 2008, although production of gold was down by 17,000 kg, or by 10%. Other increases in the production value of mineral commodities produced in the State included (in descending order of production value) lime, magnesite, dimension stone, gemstones, crude perlite, salt, and zeolites (all data withheld—company proprietary data). The largest decrease in production value took place with copper, down by 37% from the production value of 2008 (actual data withheld—company proprietary data). Significant decreases took place with the production values of construction sand and gravel, down by $25 million, or 51%; silver, down by $17 million, or 15%; barite, down by $11 million, or 61%; and, crushed stone, down by $4.5 million, or 5%. Lithium carbonate, cement, molybdenum concentrates, and industrial sand gravel saw significant production value decreases from 2008 to 2009 (actual data withheld—company proprietary data).

In 2009, Nevada continued to be the only State to produce magnesite and lithium carbonate minerals and continued to rank first of two barite-producing States, second in silver and diatomite, and fifth in the production of kaolin and pumice and pumicite. The State rose to third from fourth in copper and rose to fifth from sixth in lime production. Nevada also rose from thirteenth to twelfth in the production of gemstones (ranked based upon value). The State dropped to 5th from 4th in crude gypsum production, to 13th from 10th in the production of construction sand and gravel, and remained a producer of significant quantities of crushed stone and industrial sand and gravel. Mercury was recovered as a byproduct of gold-silver processing at several mines, but no data were reported to the USGS.

The following narrative information was provided by the Nevada Bureau of Mines and Geology[2] (NBMG). Production data in the text that follows were those reported by the NBMG as measured by mine shipments, sales, or marketable production (including consumption by producers). They were compiled by the Nevada Commission on Mineral Resources, Division of Minerals (NDM) and the Nevada Bureau of Mines and Geology, based upon the surveys, canvasses, and estimates made by those State agencies, including information gathered from company annual reports. The NDM and NBMG data were reported by those agencies to be nonproprietary and may differ from some USGS production figures as reported to and estimated by the USGS.

Exploration and Development Activities

Industrial Minerals

Barite.—Spirit Minerals LP continued to keep its claims current and staked new ones in 2009. In May 2009, Spirit Minerals was acquired by National Oilwell Varco Inc. (Houston, TX) and renamed NOV Minerals (National Oilwell Varco Inc., 2010, p. 9). Prior to 2009, Spirit Minerals had staked 42 lode claims adjacent to earlier claims in T12 and T13N, R46E in the Northumberland district in Nye County. These were in the area that includes the Monitor and Bluestone barite deposits described in NBMG Bulletin 98, Barite in Nevada (Kapke, 1984).

Cement.—Eagle Materials Inc. (Dallas, TX) received permits from the State for its planned expansion of the Fernley facility, but the downturn in the economy caused the company to put

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. Data in this report are rounded to three significant digits and percentages are calculated from unrounded data. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Jonathan G. Price, Director and State Geologist, David A. Davis, Geologic Information Specialist, and John L. Muntean, Research Economic Geologist, coauthored the text of the State mineral industry information provided by the Nevada Bureau of Mines and Geology.

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the expansion plans on hold. Once started, the project will take 18 to 24 months to complete (Eagle Materials Inc., 2010, p. 7).

Diatomite.—In 2009, Global Silica, LLC (Las Vegas, NV) staked 106 placer and two lode claims adjacent to 52 placer claims they staked in 2008. These claims were located in T4N, R37E in the Monte Cristo Range in northern Esmeralda County. The company planned to mine diatomite in section 26 and to process and sell it as amorphous silica. The U.S. Department of the Interior's Bureau of Land Management (BLM) was working on an environmental assessment, and production was tentatively scheduled for 2011.

Lithium.—Canada Lithium Corp. (Toronto, Ontario, Canada) and Gold Summit Corporation USA (Reno, NV) formed the Great Basin Joint Venture in 2008 to explore Gold Summit's Paymaster property, which encompassed about 3,100 hectares (ha) about 16 km northeast of the Chemetall Foote Co. operation at Silver Peak. Based on surface assays of up to 140 ppm lithium, a 370-m exploration hole was drilled to locate intrabasinal aquifers and to sample any brines found in 2009. Conductive layers were intersected between 325 and 338 m, and between 347 m and the total depth. Assays on brines between 149 m and total depth ranged between 130 and 940 ppm lithium with an average of 316 ppm. Because of the low values, Canada Lithium withdrew from the joint venture (Canada Lithium Corp., 2009). At the end of 2009, Gold Summit decided to concentrate on their gold and silver resources and made arrangements to sell their lithium assets to American Lithium Minerals, Inc. (Henderson, NV). American Lithium owned the Borate Hills Project, which encompassed more than 1,380 ha between 24 and 32 km west-northwest of Silver Peak. The Borate Hills project consisted of three separate claim blocks: North Borate Hills and South Borate Hills in the northern Silver Peak Range in T1S, R37E and Fish Lake Deep on the east edge of Fish Lake Valley in T1S, R36E.

In 2009, Black Hawk Exploration (Fox Island, WA) formed the subsidiary Blue Lithium Energy (Fox Island, WA) and afterwards acquired the BMP Placer Claims. The BMP group consisted of 56 placer claims covering 450 ha in Clayton Valley just north of Chemetall Foote Corp.'s (a subsidiary of Chemetall GmbH of Frankfurt, Germany) Silver Peak operation. Blue Lithium Energy received a permit from the BLM to drill an exploration hole.

In 2009, TNR Gold Corp. (Vancouver, British Columbia, Canada) signed a letter of agreement to acquire up to a 100% interest in the Sarcobatus Flats lithium brine property from Tonogold Resources, Inc., of La Jolla, CA. The property consisted of 105 placer claims covering 1,080 ha, and was located about 282 km south of Tonopah. A preliminary sampling program of surface sediments contained assays ranging between 210 and 340 ppm lithium (TNR Gold Corp., 2009).

Zeolites.—Nevada Specialty Minerals, LLC leased 518 ha to explore and develop the Lovelock zeolite deposit 21 km northwest of Lovelock in the Trinity Range in the Gold Butte district of Pershing County. The Lovelock zeolite deposit contained ferrierite and mordenite with an outcrop area about 1,200 m long from north to south, averaging 600 m wide, and up to 17 m thick near the center. The host rock was a series of Miocene or Pliocene unnamed sedimentary rocks and tuffs.

Metals

Exploration for metallic ores in Nevada slowed considerably in 2009 due to the economic crisis that began in the fall of 2008. Nevada county recorders registered more than 190,000 claim filings in 2009, a 14% decrease from the total number of claims in 2008. These included new claims and annual maintenance of existing claims. The BLM listed about 15,700 new active claims, a 24% decrease from the total number of claims in 2008. Companies that staked the most claims in 2009 were Fronteer Development Group Inc. (Vancouver, British Columbia, Canada) with 950 claims; Western Lithium Corp. (Reno, NV) with 826 claims; Infrastructure Materials Corp. (Reno, NV) with 808 claims, mostly for limestone; Kinross Gold Corp. (Toronto, Ontario, Canada) with 720 claims; and, Renaissance Exploration Inc. (Reno, NV) with 678 claims. Barrick Gold Corp. (Toronto, Ontario, Canada) and Newmont Mining Corp. (Greenwood Village, CO) staked only 113 and 34 claims, respectively. Only 64 drilling projects were reported in 2009, compared to 123 in 2008.

Only 4 of the 64 projects that reported drilling were for metals other than gold: Quadra Mining Ltd.'s (Vancouver, British Columbia, Canada) Robinson Mine in the Yerington district for copper; PacMagMetals Ltd.'s (West Perth, Australia) Ann Mason project, also in the Yerington district, for copper; Golden Predator Royalty and Development Corp.'s (now Americas Bullion Royalty Corp., of Whitehorse, Yukon Territory, Canada) Taylor Mine south of Ely for silver; and Western Uranium Corp.'s (Vancouver, British Columbia, Canada) Kings Valley project near McDermitt for uranium and gold. Additional nongold projects that did not report drilling in 2009 included: General Moly Inc.'s (Lakewood, CO) Mount Hope molybdenum project north of Eureka, which was waiting on final permits before commencing production; General Moly's Liberty molybdenum mine north of Tonopah, where operations were suspended until Mount Hope begins production; Nevada Copper Corp.'s (Vancouver, British Columbia, Canada) Pumpkin Hollow copper project in the Yerington district; and Quaterra Resources Inc.'s (Vancouver, British Columbia, Canada) MacArthur copper project in the Yerington district.

Gold.—Gold continued to be the primary mineral commodity for exploration activities in Nevada in 2009. Exploratory drilling occurred mainly on existing mine sites by major companies. Barrick carried out major drill programs at its Cortez, Turquoise Ridge, Bald Mountain, South Arturo, and Goldstrike Mines. Newmont's exploration programs focused mainly in and around its mines on the northern Carlin trend and at its Phoenix Mine, whereas Goldcorp drilled nearly 91,000 m on its Marigold Mine property. The only other drill programs carried out by large companies outside of their active mine areas were Barrick's exploration program at Spring Valley, a joint venture with Midway Gold Corp., and Newmont's exploration programs at Sandman, a joint venture with Fronteer Development Group Inc., and at Buffalo Valley, a joint venture with Fairmile Goldtech Inc. (Vancouver, British Columbia, Canada).

Several smaller companies carried out intensive exploratory programs on other gold projects. Fronteer Development Group Inc., with AuEx Ventures Inc., continued to explore the Long

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Canyon project in northeastern Nevada, drilling several high-grade oxide intercepts. Agnico-Eagle Mines Ltd., (Toronto, Ontario, Canada) in a joint venture with AuEx Ventures Inc., drilled more than 15,000 m at the adjacent West Pequop project, encountering several high-grade intercepts in several areas.

Commodity Review

Industrial Minerals

Barite.—According to data from the NDM, Nevada's barite production decreased 20% to 432,000 metric tons (t) from 540,000 t shipped in 2008 (Driesner and Coyner, 2010, p. 22). Although this was still considerably more than the recent low production of 342,000 t in 2002, it was far below the 2.25 million metric tons (Mt) high in 1981. The difference in reported production was that the U.S. Geological Survey reported run-of-mine, flotation, or other beneficiated material that was sold or used by the producer, while the NDM reported what was shipped and can include some material from stockpiles. About 95% of the barite sold domestically was used as a weighting agent in oil and gas well drilling fluids. According to the U.S. Geological Survey, shipments of ground barite from Nevada mostly went to Colorado, Utah, and Wyoming gas drilling customers.

M-I SWACO (Houston, TX), a subsidiary of Schlumberger Ltd. (Houston, TX), was the leading Nevada barite producer in 2009. Their production decreased 31% to 200,000 t from 289,000 t shipped in 2008 of crude and ground barite from the Greystone Mine and Battle Mountain plant, both in Lander County (Driesner and Coyner, 2010, p. 12). Except for 185,000 t shipped in 2002, this was the lowest production since 81,600 t were shipped in 1994. A small amount of barite was also taken from old stockpiles in the nearby Mountain Springs Mine for blending at the plant. The barite of the Greystone Mine was in black chert and minor argillite and shale of the Middle to Late Devonian Slaven Chert.

Baroid Drilling Fluids (Houston, TX), a subsidiary of Halliburton Co. (Dallas, TX), was the second leading producer in Nevada. Their production decreased 8% to 155,000 t from 170,000 t shipped in 2008 (Driesner and Coyner, 2010, p. 15). The company mined barite from the Rossi Mine in Elko County and processed it at the Dunphy Mill in Eureka County. Heemskirk Consolidated, Ltd. (Melbourne, Australia) used barite from the Dunphy Mill for their Lethbridge, Alberta, plant. The barite was then supplied to the western Canadian drilling mud market. The barite occurred in chert of the Ordovician Vinini Formation. Baker Hughes INTEQ (Houston, TX) shipped 82,000 t of barite from its Argenta operation near Battle Mountain in Lander County (Driesner and Coyner, 2010, p. 12).

Cement.—The only cement producer in Nevada was the Nevada Cement Co. (a subsidiary of Eagle Materials, Inc., of Dallas, Texas), whose plant was in Fernley, Lyon County. The plant was built in 1964 with a rated annual clinker capacity of 460,000 t, and produces Type I/II, low alkali, moderate sulfate-resistant cement, and IP-blended cement (Nevada Cement Co., 2014). The cement was manufactured from Tertiary lacustrine limestone mined a few miles south of Fernley, and from other raw materials that come from northern Nevada and elsewhere. Most of the cement went to the northern Nevada market with a minimal amount going to California. Both markets were adversely impacted by the housing slowdown. Though production from the Fernley facility was confidential, Eagle Materials reported its overall cement sales revenues were down 16% in 2009 (Eagle Materials Inc., 2010, p. 25).

Diatomite.—EP Minerals, LLC (Reno, NV), a subsidiary of Golden Gate Capital (San Francisco, CA), and the second leading diatomite producer in the world, produced most of Nevada's diatomite. The Colado operation in Pershing County was the company's most productive Nevada operation, primarily making filtration products from diatomite mined about 24 km to the northwest in the Velvet mining district. The diatomite occurred in thick beds interbedded with freshwater tuffaceous sedimentary rocks of probable Miocene age. The company also produced diatomite used in fillers and absorbents at its Clark plant and mine in the Clark mining district in Storey County, about 32 km east of Reno, and diatomite used in insulation from a pit near Hazen in Lyon County. The diatomite at Clark occurred with diatomaceous shale and thin beds of volcanic tuff within the Miocene-Pliocene Kate Formation and consisted of about 90% of the diatom Melosira granulata.

Celite Corp. (Lompoc, CA) operated a plant in Fernley that produces diatomite fillers and mined its Nightingale deposit north of Fireball Ridge in Churchill County. The Hazen Pit was placed on standby and not mined in 2009. Celite was a subsidiary of Imerys Filtration Minerals (Paris, France), the world's leading diatomite producer, itself a subsidiary of Imerys S.A. (Paris, France), a large French industrial minerals company.

Moltan Co. (Memphis, TN) shipped absorbent products, cat litter, and soil conditioner under several labels from a mine and plant complex in Churchill County about 32 km northeast of Fernley in the Desert mining district. Diatomite deposits in western Churchill County were interbedded with Pliocene lacustrine tuffaceous shale, sandstone, and limestone and siliceous tuff. Dicalite-Dicaperl Minerals Inc.'s (Bala Cynwyd, PA, formerly Grefco Minerals, Inc.) diatomite operation near the Esmeralda/Mineral County line was small relative to other Nevada diatomite companies but has been producing diatomite for many years for fillers. The deposit was in Miocene-Pliocene lacustrine sedimentary rocks consisting of diatomite, argillaceous and calcareous diatomite, clay, sand, and volcanic ash, and the main diatoms were Melosira granulata, Stephanodiscus aslraea, and Eunotia robusta.

Gemstones.—Precious opal was produced from several mines in the Virgin Valley area of northern Humboldt County. Virgin Valley was a well-known source of gemstones in North America. The best known mines were the Royal Peacock, Rainbow Ridge, Bonanza, and Hidden Valley Mines. In 2009, the Bonanza, Rainbow Ridge, and Royal Peacock Mines together produced about 45 kg from pay-to-dig operations. In 2009, less than 45 kg of turquoise was shipped from the Blue Ridge Mine, a family-owned property in the Bullion district of Lander County.

Gypsum.—According to data from NDM, Nevada's gypsum production decreased 14% to an estimated 1 Mt, which was the sixth consecutive annual decline (Driesner and Coyner,

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2010, p. 22). PABCO Gypsum (Newark, CA) in Clark County northeast of Las Vegas was the leading Nevada producer in 2009. Production fell 14% to about 649,000 t in 2009 from about 753,000 t of crude gypsum in 2008. This was the fourth annual decline and a drop of 58% since 2005, when production peaked at 1.5 Mt (Driesner and Coyner, 2010, p. 21). PABCO Gypsum processed the gypsum into wallboard at a plant adjacent to its mining operation.

U.S. Gypsum Corp. (Chicago, IL), the Nation's leading wallboard producer, was the second leading Nevada producer in 2009. Production decreased 24% to 183,000 t in 2009 from 240,000 t in 2008. This was the third annual decline and a drop of 45% since 2006, when production last peaked at 335,000 t (Driesner and Coyner, 2010, p. 8). The company mined gypsum in western Pershing County and processed it into wallboard and plaster at a plant at Empire in Washoe County.

Lithium.—Nevada was the only State with domestic production of lithium raw materials, and as this production was from one company, actual production and consumption figures were withheld to protect company proprietary data. Chemetall Foote Co. owned and operated the Silver Peak lithium facility in Esmeralda County about 48 km from Tonopah. The company produced lithium carbonate, lithium hydroxide monohydrate, and lithium hydroxide anhydrite. The lithium chemicals were produced by solar evaporation preconcentration and subsequent refining techniques from brine that was pumped from beneath Clayton Valley playa. Lithium brine varied between 100 and 300 ppm.

Magnesium (Magnesite).—In 2009, Molycor Gold Corp. (White Rock, British Columbia, Canada) published a Canadian National Instrument 43–101 technical report on their Tami-Mosi magnesium property in the western foothills of the Schell Creek Range between Tamberlain and Mosier Canyons about 10 km southeast of Ely in White Pine County. The property consisted of about 140 claims covering 1,150 ha and the company reported an inferred resource of about 237 Mt of virtually pure dolomite grading 10% magnesium (more than 23 Mt of magnesium) (Nevada Clean Magnesium, Inc., 2009). The rock was in the Simonson Dolomite unit of the Devonian Guilmette Formation.

Perlite.—Nevada had large perlite resources, and several deposits of perlite in central Pershing, northern Lincoln, and southern Clark Counties have been mined extensively over the preceding decades. However, in 2009, the State produced only minor amounts of perlite. Current perlite production in Nevada was restricted to relatively small-scale mining of two deposits for niche markets. Wilkin Mining and Trucking Inc. (Caliente, NV) mined perlite from the Tenacity Perlite Mine in the South Pahroc Range Mining district about 40 km west of Caliente in Lincoln County. The company has been mining perlite in the area for more than 25 years. Wilkin had a small popping plant in Caliente, and sales were almost exclusively of expanded perlite that was used for horticultural purposes. The deposit consisted of a large, flat-lying 6-meter-thick perlite flow with obsidian pellets in Tertiary rhyolitic volcanic rocks.

Dicalite-Dicaperl Minerals Inc. (Bala Cynwyd, PA, formerly Noble Perlite) produced expanded perlite from a plant in Fallon. They have eight placer claims about 32 km south-southeast of Fallon on the south side of the White Throne Mountains, but these claims were not mined in 2009. Noble purchased ore in New Mexico, which was brought in by truck and train. Most of their processed perlite was microspheres used for fillers. EP Minerals, LLC produced a small amount of expanded perlite that was marketed as a filter aid from its Colado diatomite plant in Pershing County. Plant capacity was 10,800 t/yr, but 2009 production was not available (EP Minerals, LLC, 2014). The crude perlite came from the Popcorn Mine about 24 km south of Fallon in Churchill County, which was usually mined a week or two per year.

Potash.—The Rulco LLC (Igancio, CO) potassium sulfate project was temporarily shut down throughout 2009, but claims were kept current. Between 2001 and 2008, small amounts of potassium alum (kalinite) were shipped from the deposit in Esmeralda County about 16 km north of Silver Peak. The kalinite, which occurred with sulfur as veins and stringers in rhyolitic rock, was being marketed for horticultural use.

Pozzolan.—In 2009, the Fernley Planning Commission approved a special use permit for Nevada Cement Co. to operate their proposed Mustache Pozzolan Quarry on 10 ha of BLM land about 5 km southwest of Fernley in section 28, T20N, R24E. The quarry was proposed to operate for 25 years and produce up to 907,000 t of material (reported as 1 million short tons). The site was largely in Miocene to lower Pliocene Chloropagus Formation, which mainly consisted of basaltic and andesitic lava flows and breccias interbedded with rhyolitic tuffs and minor sedimentary rocks. Shale would be mined at the rate of up to 20 dump truck loads, averaging 18 to 27 t/d, 6 days per week, and hauled to the Nevada Cement Co. plant to be heated and turned into pozzolan. This locally produced pozzolan would reduce the company's costs by reducing the need to bring in fly ash from coal-fired power plants or tuff from elsewhere in the State or from California, which were being used as pozzolan (City of Fernley Planning Commission, 2009).

Sand and Gravel, Industrial.—According to data from NDM, Nevada's major silica producer, Simplot Silica Products (a subsidiary of J. R. Simplot Co., of Boise, ID) at Overton, Clark County, shipped about 375,000 t of silica sand in 2009, a decrease of 17% from 2008 (Driesner and Coyner, 2010, p. 21). The sand was mined from a large open pit in the relatively friable Cretaceous Baseline Sandstone, washed in the pit, and transported via an 8-km slurry pipeline to a plant where it was screened and bagged. The facility produced four grades of sand based on coarseness—AFS 55, 60, 70, and 100. AFS 70, which was used mainly in manufacturing glass and foundry castings, was the primary product. Simplot proposed to expand its pit and, in 2009, BLM issued an environmental assessment (U.S. Bureau of Land Management, 2009). Simplot estimated that silica sand resources in the current direction of mining would be exhausted in 6 months, and the expansion would enable operations to continue another 30 to 40 years.

Metals

Copper and Molybdenum.—Nevada produced 66,100 t of copper, a 17% decrease, and 136 t of molybdenum, a 7.8% increase, from that of 2008. Quadra Mining Inc.'s Robinson

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Mine near Ely in White Pine County produced 84% of Nevada's copper in 2009, amounting to 55,300 t, or a 24% decrease, from that of 2008 (Driesner and Coyner, 2010, p. 15). Newmont's Phoenix Mine near Battle Mountain in Lander County made up the balance of the 2009 copper production, producing 10,800 t, a 50% increase from that of 2008 (Driesner and Coyner, 2010, p. 12). Win-Eldrich Mines Ltd. (Toronto, Ontario, Canada) reopened the Ashdown Mine in Humboldt County and reported 97 t of molybdenum production in 2009. Quadra reported 40 t of molybdenum from its Robinson Mine (Driesner and Coyner, 2010, p. 15).

Gold and Silver.—Nevada produced 160,000 kg (5 million troy ounces) of gold and 230,000 kg (7 million troy ounces) of silver in 2009 (Driesner and Coyner, 2010, p. 22). Production was down from 2008, by almost 12% for gold, and by 8% for silver. Fifty percent of the gold production in 2009 came from mines on the Carlin trend, helping Barrick Gold Corp. and Newmont Mining Corp. to continue their dominance of Nevada's gold production. Barrick and Newmont accounted for 89% of production in 2009 (Driesner and Coyner, 2010).

Barrick produced the most gold, with production from its 75% share of Bald Mountain, Cortex, Goldstrike, Ruby Hill, and Turquoise Ridge Mines, plus its 50% share of the Round Mountain Mine's production and its 33% share of the Marigold Mine's, totaling about 76,000 kg (2.4 million troy ounces) of gold, a 14.1% decrease from 2008 (Driesner and Coyner, 2010). Newmont produced 62,500 kg (2 million troy ounces) of gold, a 9.4% decrease from 2008. It reported production from its Carlin trend mines and from the Lone Tree, Midas, Phoenix, and Twin Creeks Mines, plus its 25% share of the Turquoise Ridge Mine (Driesner and Coyner, 2010). Newmont was the leading silver producer in 2009, producing 98,200 kg (3 million troy ounces), primarily from its Midas and Phoenix Mines (Driesner and Coyner, 2010, p. 7–15). Coeur d'Alene Mines Corp. recovered 67,900 kg (2 million troy ounces) of silver from the leach pads at its Rochester Mine, where mining stopped in 2007 (Driesner and Coyner, 2010, p. 8). Several gold projects were in the permitting stage during 2009, including Newmont's Genesis Mine expansion north of Carlin and Emigrant Gap deposit south of Carlin; Kinross Gold Corp. and Barrick Gold's Gold Hill deposit near the Round Mountain in Nye County; Atna Resources Ltd.'s Reward Mine, near Beatty in Nye County; and Imperial Metal Corp.'s Sterling Mine, also near Beatty in Nye County.

Iron Ore.—In 2009, the Saga Exploration Company shipped iron ore from stockpiles at the old Nevada Barth Mine in Eureka County. The iron consisted mostly of hematite and some magnetite, and was used in the manufacture of cement.

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN NEVADA[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007		2008		2009	
		Quantity	Value	Quantity	Value	Quantity	Value
Barite		W	W	641	29,500	377	18,500
Gold[3]	kilograms	186,000	4,170,000	178,000	5,000,000	161,000	5,040,000
Sand and gravel, construction		34,800 r	180,000	29,500 r	163,000 r	21,400	138,000
Silver[3]	kilograms	243,000	105,000	235,000	113,000	203,000	95,900
Stone, crushed		12,700	111,000	10,200 r	95,100 r	8,290	90,500
Combined values of brucite (2007), cement (portland), clays (bentonite, fuller's earth, kaolin), copper, diatomite, gemstones (natural), gypsum (crude), lime, lithium carbonate, magnesite, molybdenum concentrates, perlite (crude), pumice and pumicite, salt, sand and gravel (industrial), stone (dimension), zeolites, and value indicated by symbol W		XX	831,000 r	XX	893,000 r	XX	639,000
Total		XX	5,400,000 r	XX	6,290,000 r	XX	6,020,000

rRevised. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Recoverable content of ores, etc.

TABLE 2

NEVADA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	7	3,520	$36,300	7	2,890	$36,300
Granite	7	1,290	7,650	6	189	1,430
Sandstone and quartzite	2 r	899 r	8,370 r	2	670	7,380
Volcanic cinder and scoria	2	212	2,020	2	149	1,440
Miscellaneous stone	13 r	4,290 r	40,700 r	13	4,390	44,000
Total	XX	10,200 r	95,100 r	XX	8,290	90,500

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
NEVADA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	25	287
Filter stone	W	W
Other coarse aggregate	W	W
Coarse aggregate, graded:		
Concrete aggregate, coarse	567	6,270
Bituminous aggregate, coarse	282	3,560
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	10	106
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Other fine aggregate	W	W
Coarse and fine aggregates:		
Graded road base or subbase	207	1,220
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Roofing granules	W	W
Agricultural:		
Limestone	W	W
Other agricultural uses	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Other miscellaneous uses and specified uses not listed	24	873
Unspecified:[2]		
Reported	2,360	24,700
Estimated	2,500	25,600
Total	8,290	90,500

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
NEVADA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND BY DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[2]	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W
Fine aggregate (-⅜ inch)[4]	--	--	W	W
Coarse and fine aggregates[5]	W	W	W	W
Other construction materials	--	--	259	1,220
Agricultural[6]	W	W	--	--
Chemical and metallurgical[7]	W	W	W	W
Other miscellaneous uses	--	--	24	873
Unspecified:[8]				
Reported	428	3,420	1,930	21,300
Estimated	35	359	2,470	25,300
Total	1,240	22,600	7,050	68,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other graded coarse aggregate.

[4]Includes stone sand (concrete) and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone and other agricultural uses.

[7]Includes cement and lime manufacture.

[8]Reported and estimated production without a break down by end use.

TABLE 5
NEVADA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates and concrete products	3,540	$30,800	$8.68
Plaster and gunite sands	417	3,570	8.55
Asphaltic concrete aggregates and other bituminous mixtures	1,170	12,400	10.62
Road base and coverings	3,320	19,200	5.76
Fill	630	3,190	5.07
Snow and ice control	68	357	5.25
Other miscellaneous uses[2]	254	4,310	16.98
Unspecified:[3]			
Reported	6,130	23,000	3.75
Estimated	5,830	40,900	7.01
Total or average	21,400	138,000	6.44

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes filtration, railroad ballast, and roofing granules.

[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

NEVADA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	522	4,280	3,440	30,100	--	--
Asphaltic concrete aggregates and road base materials	561	3,790	3,930	27,700	--	--
Fill	266	1,620	364	1,570	--	--
Other miscellaneous uses[3]	190	3,400	132	1,280	--	--
Unspecified:[4]						
Reported	650	5,830	1,360	8,500	4,120	8,630
Estimated	1,080	7,360	4,750	33,500	--	--
Total	3,270	26,300	14,000	103,000	4,120	8,630

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes filtration, railroad ballast, roofing granules, and snow and ice control.

[4]Reported and estimated production without a breakdown by end use.

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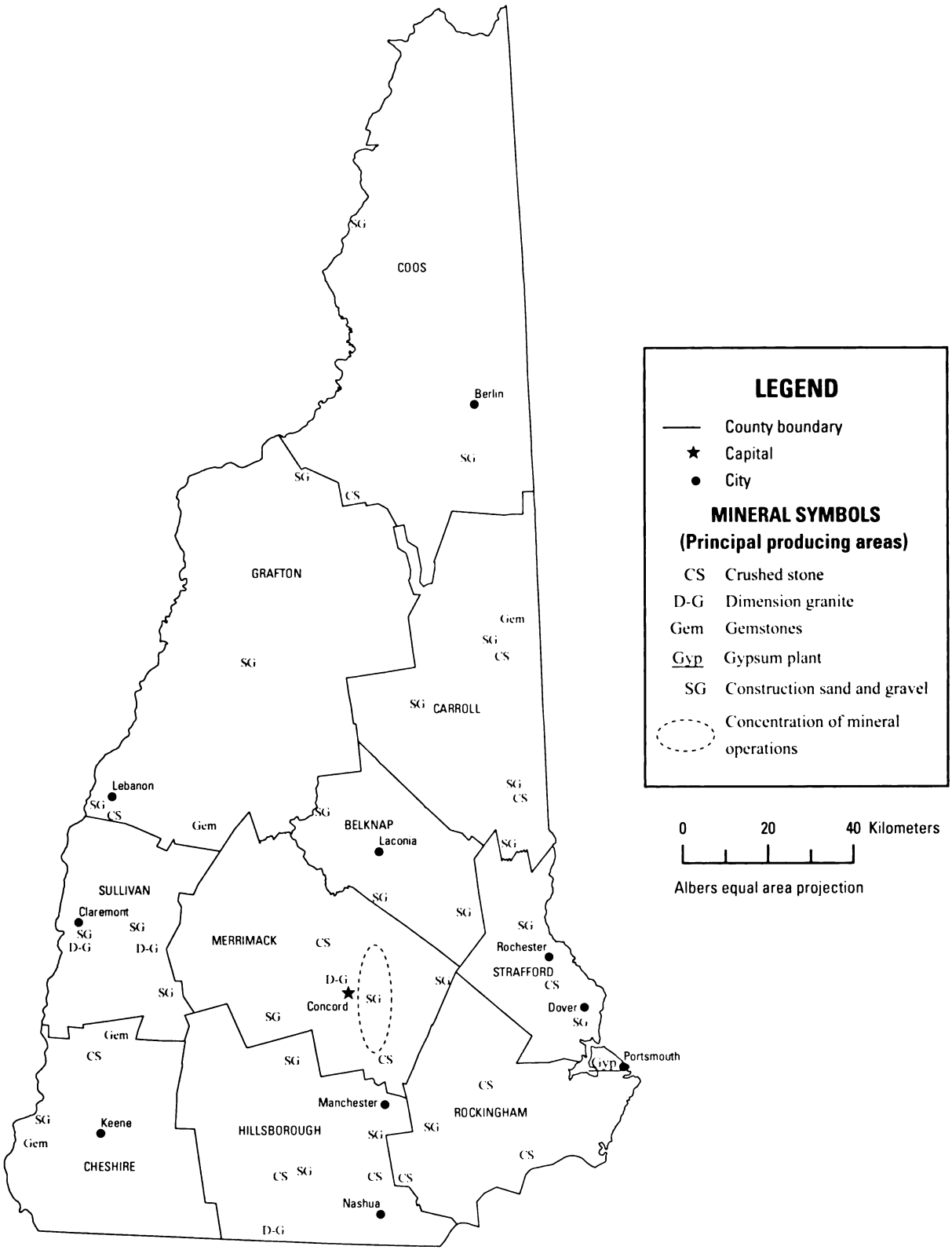
NEW HAMPSHIRE



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THE MINERAL INDUSTRY OF NEW HAMPSHIRE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New Hampshire Geological Survey for collecting information on all nonfuel minerals.

In 2009, New Hampshire's nonfuel raw mineral production[1] was valued at $108 million, based upon annual U.S. Geological Survey (USGS) data. This was a $1 million, or 0.9%, increase from the State's total of $107 million in 2008, which was down by $17 million, or 13%, from the State's total value of $124 million in 2007. New Hampshire remained 47th in rank among the 50 States in total raw nonfuel mineral production value.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

Construction sand and gravel production value was New Hampshire's leading nonfuel mineral commodity in 2009, accounting for 51% of the State's total nonfuel mineral industry. The value of construction sand and gravel increased by $4.4 million, or 8.6%, despite an almost 15% decline in the quantity produced. The second leading mineral commodity in New Hampshire was crushed stone, comprising almost 44% of the State's total value. Crushed stone production value fell by $3.9 million, or 7.6%, with a 9.5% decline in production quantity. The production value of dimension granite decreased slightly from 2008 values, declining by 0.4%, which had followed a 12% decline from 2007 values. In 2009, New Hampshire continued to be a significant producer of dimension stone, increasing to 11th from 13th in 2008 among the 37 dimension stone-producing States.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW HAMPSHIRE[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	6	NA	7	NA	7
Sand and gravel, construction	8,150 r	50,300 r	8,150 r	51,200 r	6,930	55,600
Stone:						
Crushed	6,550	67,800	5,170	50,900	4,680	47,000
Dimension, granite	37	5,570	34	4,900	35	4,880
Total	XX	124,000 r	XX	107,000 r	XX	108,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NEW HAMPSHIRE: CRUSHED STONE SOLD OR USED, BY TYPE[1]

	2008			2009		
Type	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Granite	11	1,860	$18,500	13	2,720	$27,000
Traprock	10	2,950	28,700	8	1,600	16,700
Sandstone and quartzite	2	242	2,380	2	181	1,820
Miscellaneous stone	3	125	1,230	3	183	1,580
Total	XX	5,170	50,900	XX	4,680	47,000

XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
NEW HAMPSHIRE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	50	586
Filter stone	W	W
Coarse aggregate graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	389	3,750
Bituminous surface-treatment aggregate	W	W
Fine aggregate (-⅜ inch):		
Stone sand, concrete	155	1,420
Stone sand, bituminous mix or seal	342	4,530
Screening, undesignated	W	W
Other fine aggregate	1	11
Coarse and fine aggregates:		
Graded road base or subbase	284	2,120
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	264	1,940
Other construction materials	18	192
Unspecified:[2]		
Reported	1,620	16,200
Estimated	906	9,110
Total	4,680	47,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

TABLE 4
NEW HAMPSHIRE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	284	$3,170	$11.16
Asphaltic concrete aggregates and other bituminous mixtures	526	5,160	9.80
Road base and coverings[2]	1,380	10,600	7.71
Fill	468	1,870	4.00
Snow and ice control	60	464	7.73
Golf course	17	190	11.18
Other miscellaneous uses[3]	122	1,170	9.55
Unspecified:[4]			
Reported	228	1,670	7.32
Estimated	3,850	31,300	8.13
Total or average	6,930	55,600	8.02

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes road and other stabilization (cement and lime).

[3]Includes filtration.

[4]Reported and estimated production without a breakdown by end use.

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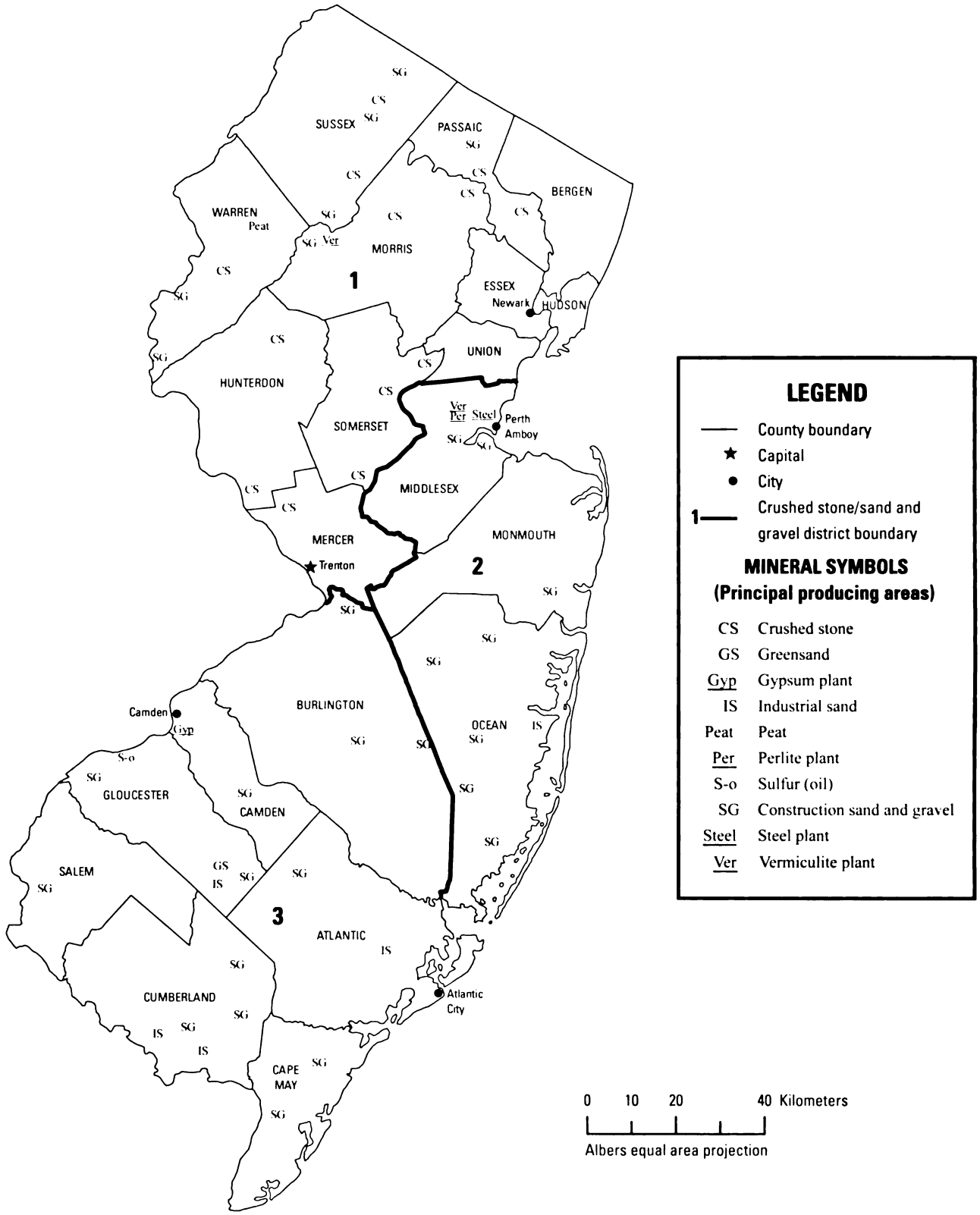
NEW JERSEY



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THE MINERAL INDUSTRY OF NEW JERSEY

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New Jersey Geological Survey for collecting information on all nonfuel minerals.

In 2009, New Jersey's nonfuel raw mineral production[1] was valued at $270 million, based upon annual U.S. Geological Survey (USGS) data. This was a $69 million, or 20%, decrease from the State's total nonfuel mineral value of $339 million in 2008, which had decreased by 1% from the total of $343 million in 2007. The State continued to rank 37th among the 50 States in total nonfuel mineral production. Because production data for greensand marl and peat were withheld to avoid disclosing company proprietary data in 2008 and in 2009, the State's actual annual total values are significantly higher than those listed in table 1.

Crushed stone and construction sand and gravel were New Jersey's leading mineral commodities by value, together accounting for 89% of the State's total value. The decrease in New Jersey's total production value was led by decreases in the value of construction sand and gravel, down $37 million, or 24%, from $153 million in 2008 to $116 million in 2009, followed by crushed stone, down $31 million, or 20%, from $155 million to $124 million. Production of construction sand and gravel decreased by 2.5 million metric tons (Mt), or 18%, from a total of 13.6 Mt produced in 2008 to 11.1 Mt in 2009. Production of crushed stone decreased by 3.4 Mt, or 19%, from 17.9 Mt in 2008 to 14.5 Mt in 2009, mostly due to a sharp decline in the production of traprock (table 2). Industrial sand and gravel, accounting for 11% of the State's total nonfuel production value, decreased in value by $1.6 million.

In 2009, New Jersey continued to be the only State to produce greensand marl. The State remained ninth in the production of industrial sand and gravel and remained eighth out of the 12 peat-producing States. New Jersey continued to rank in the middle among the 50 States for the production of construction sand and gravel and crushed stone.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW JERSEY[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	65	(3)	--	--	--	--
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	15,700 r	145,000	13,600 r	153,000 r	11,100	116,000
Industrial	1,090	33,200	1,010	31,800	906	30,200
Stone, crushed	20,000	162,000	17,900	155,000	14,500	124,000
Combined values of greensand marl, peat, and value indicated by footnote 3	XX	3,220	XX	W	XX	W
Total	XX	343,000	XX	339,000 r	XX	270,000

r Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable. -- Zero.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Withheld value included in "Combined values" data.

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TABLE 2
NEW JERSEY: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Granite	6	5,860	$51,700	6	5,770	$51,000
Traprock	14	12,000	103,000	13	8,660	71,800
Miscellaneous stone	1	62	538	1	107	908
Total	XX	17,900	155,000	XX	14,500	124,000

XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
NEW JERSEY: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	70	558
Filter stone	W	W
Other coarse aggregate	167	1,750
Coarse aggregate, graded:		
Concrete aggregate, coarse	953	10,200
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Fine aggregate (- 3/8 inch):		
Stone sand, concrete	W	W
Screening, undesignated	669	5,300
Other fine aggregate	509	5,090
Coarse and fine aggregates:		
Graded road base or subbase	311	2,320
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	2,250	17,300
Unspecified:[2]		
Reported	6,220	53,000
Estimated	2,060	17,500
Total	14,500	124,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
NEW JERSEY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,350	$26,300	$11.19
Plaster and gunite sands	401	5,490	13.70
Concrete products (blocks, bricks, pipe, decorative, etc.)	191	2,290	12.00
Asphaltic concrete aggregates and other bituminous mixtures	1,310	17,500	13.37
Road base and coverings	438	8,190	18.71
Fill	402	2,610	6.48
Snow and ice control	40	569	14.23
Other miscellaneous uses[2]	164	2,140	13.05
Unspecified:[3]			
Reported	790	6,260	7.93
Estimated	5,010	45,000	8.98
Total or average	11,100	116,000	10.49

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes filtration and golf course.
[3]Reported and estimated production without a breakdown by end use.

TABLE 5
NEW JERSEY: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	825	11,600	922	13,500	1,190	8,910
Asphaltic concrete aggregates and road base materials	W	W	1,130	19,200	W	W
Fill	117	1,070	240	965	45	567
Other miscellaneous uses[3]	387	5,180	1	12	439	4,020
Unspecified:[4]						
Reported	5	79	1	18	785	6,170
Estimated	1,630	15,500	2,180	17,900	1,210	11,600
Total	2,960	33,400	4,470	51,700	3,670	31,300

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes filtration, golf course, and snow and ice control.
[4]Reported and estimated production without a breakdown by end use.

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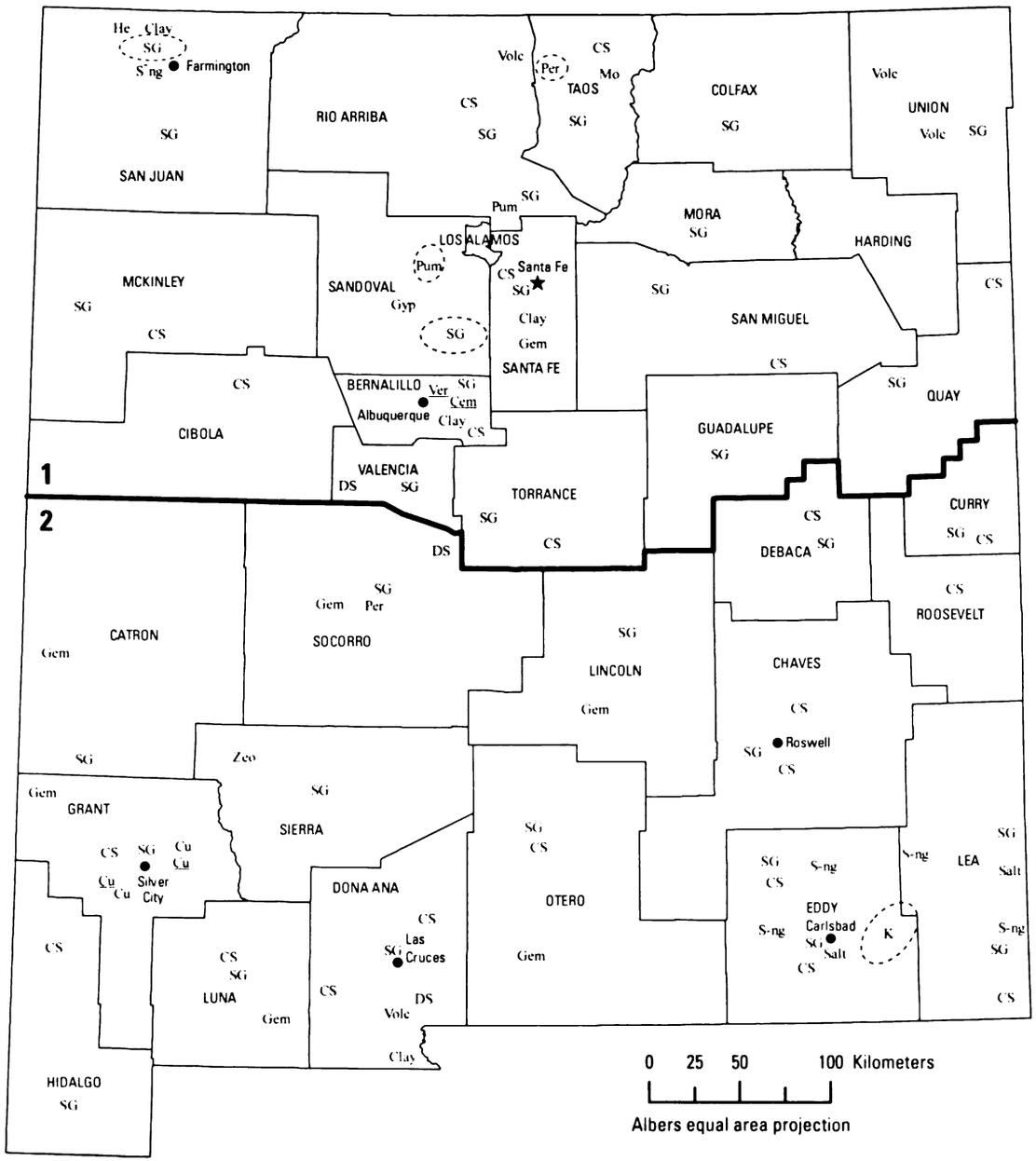
NEW MEXICO



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
DS	Dimension stone
Gem	Gemstones
Gyp	Gypsum
He	Helium
K	Potash
Mo	Molybdenum
Per	Perlite
Pum	Pumice and pumicite
S-ng	Sulfur (natural gas)
Salt	Salt
SG	Construction sand and gravel
Ver	Vermiculite plant
Volc	Volcanic cinder
Zeo	Zeolites

Concentration of mineral operations

Source: New Mexico Bureau of Geology and Mineral Resources/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF NEW MEXICO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New Mexico Bureau of Geology and Mineral Resources for collecting information on all nonfuel minerals.

In 2009, New Mexico's nonfuel raw mineral production[1] was valued at $886 million, based upon annual U.S. Geological Survey (USGS) data. This was a $744 million, or almost 46%, decrease from the State's total nonfuel mineral value of $1.63 billion in 2008, which had increased by nearly $50 million, or 3%, from a total of $1.58 billion in 2007. The State decreased to 23d from 15th in rank among the 50 States in total nonfuel mineral production value and accounted for 1.5% of the U.S. total. This is the State's lowest ranking since it ranked 25th in 2003, then accounting for 1.44% of the U.S. total.

The top nonfuel minerals in 2009 were, in descending order by production value, potash, copper, construction sand and gravel, crushed stone, and portland cement. These accounted for nearly 94% of the State's total nonfuel raw mineral production value. Potash, which had been the State's second leading nonfuel mineral produced in 2008, became the State's leading mineral in 2009. Copper decreased to second, accounting for almost 34% of the State's total nonfuel mineral production value, down from 45% in 2008. Copper had led for 38 of the past 41 years (from 1968 through 2009). Potash, which had been reported as potassium salts prior to 1990, was the State's leading nonfuel mineral in the early 1950s through 1967, in 1982, and in 2002–03.

In 2009, only five mineral commodities produced in New Mexico saw an increase or no change in total production value from those in 2008: salt (up by 13%), masonry cement (up by 35%), zeolites (up by 5%), dimension stone (up by 5%), and gemstones (no change). All other mineral commodities saw decreases in production value in 2009, most notably copper, down almost $434 million, or 59%. Following copper was molybdenum concentrates (down by 95%), potash (down by 26%), and portland cement (down by almost 25%); combined these three mineral commodities—actual production data are withheld to protect company proprietary data—were down almost $278 million. Other commodities that saw very substantial decreases in total production value included construction sand and gravel (down by $9.3 million), gold, silver, crude perlite, and crushed stone.

Quantities of mineral commodities produced in New Mexico were also down, except for increases that took place in the production of salt (up by 18%), masonry cement (up by 40%), dimension stone (up by 18%), and construction sand and gravel (up by 0.7%). Metal production in the State was down significantly, with the production of molybdenum concentrates down 93% and gold and silver down 99% each. Copper production was down by 48,000 metric tons (t), or 46%, from a total of 104,000 t in 2008 to 56,500 t in 2009.

In 2009, New Mexico continued to lead the Nation in the quantities of crude perlite, potash, and zeolites (descending order of value) produced and remained sixth in molybdenum concentrates. The State rose in rank to 3d from 4th in pumice and pumicite production, while it decreased in rank to 4th from 3d in copper production, 10th from 7th in crude gypsum production, and to 11th from 7th and 9th, in both silver and gold production, respectively.

The following narrative information was provided by the New Mexico Bureau of Geology and Mineral Resources[2] (NMBGMR). Production data and information in the text that follows are those reported by the NMBGMR and are based on the agency's own surveys and estimates, data obtained from the New Mexico Energy, Minerals and Natural Resources Department (NMEMNRD), Mining and Minerals Division (MMD), personal mine visits by NMBGMR staff, company Web sites, and cited references. These may differ from some production figures published by the USGS.

Overview

As some mineral commodity prices increased in 2009, mining and exploration in New Mexico continued to increase from past levels, while other mineral commodity prices decreased as demand for minerals fluctuated worldwide due to the uncertain economy. The value of fuel and nonfuel mineral production in 2009 from New Mexico exceeded $1.7 billion, down from the record high production value in 2008 of $2.3 billion. These figures include coal production, which is not included in USGS total production values (New Mexico Energy, Minerals and Natural Resources Department, 2010a). Mining industry payroll exceeded $287 million, also down from 2008 values (New Mexico Energy, Minerals and Natural Resources Department, 2010a). The average price of copper in 2009, using the average annual COMEX prices, was $5.19 per kilogram (kg) ($2.35 per pound). The average price of molybdenum in 2009, using the average Platts Metals Week molybdenum prices, was $25.84 per kg ($11.72 per pound).

Active mining operations in New Mexico in 2009 included: 5 coal mines; 3 potash mines, 1 potash compaction plant, and 5 potash refineries; 1 molybdenum mine and 1 molybdenum mill; 1 copper mine and 2 solvent extraction/electro-winning (SX/EW) plants; 1 gold mine; about 17 industrial mineral

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Virginia T. McLemore, Senior Economic Geologist, authored the State mineral industry information provided by the New Mexico Bureau of Geology and Mineral Resources.

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mines and 16 industrial minerals mills; and about 150 stone and aggregate operations (New Mexico Energy, Minerals and Natural Resources Department, 2010b).

Ten minimal impact exploration permits were approved for operations with an estimated impact of less than about 2 hectares (ha) (5 acres) of disturbance, with one operation of this type approved, one denied an operating permit, with an additional eight pending approval. Twelve general permits allowing less than 153 cubic meters (200 cubic yards) per year of disturbance were approved. For new mining projects, two operations that would disturb greater than about 4 ha (10 acres) had permits pending, whereas for new minimal impact mining operations disturbing less than about 2 ha (5 acres), there were five permits pending and one approved (New Mexico Energy, Minerals and Natural Resources Department, 2010b). These figures could include uranium operations, but exclude potash and coal, as per the New Mexico Mining Act of 1993. Nearly every company currently mining had comprehensive reclamation plans, and reclamation activities were ongoing throughout the State during 2009 (New Mexico Energy, Minerals and Natural Resources Department, 2010b).

The quantity of minerals produced in New Mexico had been declining since maximum annual minerals production was achieved in 1989 (McLemore and others, 2002); however, in 2008, production values increased to record values for nonfuel mineral production (New Mexico Energy, Minerals and Natural Resources Department, 2009). By yearend, the cumulative number of exploration and mining permits on file in the State totaled to more than 400, with an increase in the filing of exploration permits. With the increase in most mineral commodity prices, exploration in New Mexico was expected to increase and some of these exploration projects were anticipated to result in new mining operations. However, the outlook for the aggregate industry remained depressed for the next few years as the housing and construction industries recover from the economic recession.

Exploration and Development

In 2009, the number of exploration permits increased compared with those in previous years. Several companies are exploring for copper, gold, potash, rare earths, and silver throughout New Mexico, especially in Catron, Dona Ana, Grant, Lincoln, Rio Arriba, and Socorro Counties.

Industrial Minerals

Clay and Shale.—Daleco Resources Corp. drilled 16 holes in 2005 and continued to evaluate its Sierra Kaolin deposit throughout 2009 (also known as the Kline Mountain deposit) in the Black Range of the Gila National Forest in northwestern Sierra County. The hydrothermal kaolin deposit was in an advanced argillic alteration zone within the tuff of Kline Mountain and has been estimated to contain more than 180 million metric tons (Mt) (more than 200 million short tons) of kaolin (Isik and others, 1994). In January 2009, the company submitted its Environmental Assessment for the proposed mine to the U.S. Forest Service (Daleco Resources Corp., 2009).

Garnet, Industrial.—Although garnet has not been produced in New Mexico for the past decade, at least one company—B.O.W. Corp.—continued to explore for garnet resources in the Orogrande District, east of Las Cruces, for potential uses as an abrasive. Garnet typically has been found in skarn deposits in southern and central New Mexico, in some areas being a major constituent of waste rock piles remaining after the recovery of metals (Lueth, 1996). In one example, approximately 135,000 metric tons (t) of 20% to 36% garnet was estimated to occur in four tailing piles at Hanover, Grant County (Cetin and others, 1996).

Perlite.—Atlas Minerals Inc. (formerly Toro Mining and Minerals, Inc.) continued to evaluate its Toro perlite deposit northwest of Deming. The site has been estimated to contain 14 Mt (15 million short tons) of perlite. St. Cloud Mining continued to examine the production potential of the McCauley Ranch (Thompson Canyon) perlite deposit in Grant County.

Potash.—After the acquisition of remaining shares of Intercontinental Potash Corp. (formerly a wholly owned subsidiary of Trigon Uranium Corp.) in early December 2009, Trigon announced its new name of IC Potash Corp. later that month (IC Potash Corp., 2009a, b). At yearend, IC Potash announced results of their drilling at the Ocha Potash Project in Lea County (IC Potash Corp., 2009c). The Ocha deposit contains as much as 85% polyhalite with halite and anhydrite in the Rustler Formation (Crowl and others, 2011). Potash is a leaseable mineral and mining and exploration activities are administered by the Bureau of Land Management and excluded from the New Mexico 1993 Mining Act.

Metals

Copper.—Exploratory drilling in 1975–89 and most recently in 2006–09 northwest of the carbonate-hosted silver deposits at the Lone Mountain property, owned by Copper One Inc., in Grant County, indicated at least three distinct zones of copper mineralization (Moran and Moore, 2006; Ray and Pawlowski, 2009). A near-surface zone of copper oxide and sulfide minerals had assays over 15 meters (m) (50 feet) of core, which were reported to contain grades up to 0.9% copper. Weak pyrite-chalcopyrite porphyry-style disseminated stockwork and fissure veins were hosted by the Lone Mountain Stock and its associated dikes and sills and were reported to have grades between 0.05% and 0.1% copper. High-grade, polymetallic exoskarn copper mineralization was hosted by various calcareous sedimentary rocks close to their contact with the Lone Mountain intrusive complex and was found to be grading in some 3-m intervals greater than 7% copper with 0.7 parts per million (ppm) gold and 116 ppm silver (Ray and Pawlowski, 2009, p. 2). The intrusions have been dated at 50.6 to 51.5 million years old (Moran and Moore, 2006, p. 51). Copper One planned to continue drilling and recalculate the resources based upon current economic conditions—final exploration permits were expected either in 2010 or 2011. The Copper One Mimbres property is a copper porphyry deposit discovered by Bear Creek Exploration in the 1950–60s, also in Grant County. Assays have ranged up to 1% copper. Copper

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One planned exploration drilling to delineate specific ore bodies (Copper One Inc., 2009).

In 2007, Entrée Gold Inc. announced the discovery of a porphyry copper deposit in the Lordsburg district. Assays of drilling conducted in 2008–2009 contained ore-grade material, grading at as much as 0.33% copper and 0.26 grams per metric ton (g/t) gold over 14 m from the deposit (Entrée Gold Inc., 2009). Andesites in the Lordsburg area have been dated at 67 million years old and the granodiorite and associated rocks have been dated at 57.3 to 58.8 million years old (McLemore and others, 2000b). Additional drilling was planned.

High Desert Gold Corp. (formerly General Minerals Corp.) continued to analyze rock chip samples collected from the Gold Lake porphyry (copper, molybdenum, and gold) deposit in the White Signal District, Grant County. The deposit was hosted by quartz monzonite and rhyolite intrusions in Proterozoic rocks and was associated with porphyry-style alteration and veins. Numerous small historic mine workings are found within this area, mostly exploiting and prospecting for copper, gold, and uranium. In 2008, six drill holes confirmed the presence of copper porphyry-style mineralization. Additional drilling was planned to confirm and delineate the economic potential of the property.

Gold and Silver.—Santa Fe Gold Corp.'s combined resources from the Carache and Lucas deposits in the Ortiz Mine Grant in Santa Fe County contained an estimated 32,000 kg of gold, within the boundaries of two conceptual pits previously designed by the LAC Minerals–Pegasus joint venture, using a gold price of almost $385 per troy ounce ($12,380 per kg) (Santa Fe Gold Corp., 2012). LAC Minerals continued to perform reclamation and groundwater remediation work at the closed Cunningham Hill open pit mine in the Ortiz Mine Grant.

Micrex Development Corp. continued exploration at the Deadwood-Sunburts Claims in the Mogollon District, Catron County, and at the Banks and Mt. Royal Mines in the Steeple Rock District, Grant County. Columbus Silver Corp. was also exploring in the Mogollon District along several volcanic rock-hosted epithermal veins, where drilling returned assays of as much as 14 g/t (0.41 troy ounces per short ton) gold and 531 g/t (15.5 troy ounces per short ton) silver (Columbus Silver Corp., 2009).

El Capitan Precious Metals Inc. continued to explore for iron and gold from iron skarns adjacent to the Capitan pluton in Lincoln County. The San Lorenzo claims permit in Socorro County was still under development to mine for gold. Two new gold mines had Mining Act permit applications under review in 2008–09—the Orogrande placer gold mine in Otero County and the Northstar Mine in Rio Arriba County (New Mexico Energy, Minerals and Natural Resources Department, 2009). Exploration began for precious and base metals in the Burro Mountains mining district by Black Hawk Exploration.

Molybdenum.—In 2008, Galway Resources Ltd. announced that the Victorio Mountains deposit in Luna County contained indicated resources of 21.5 Mt at 0.15% molybdenum and 0.13% tungsten trioxide with a combined $40 per metric ton cutoff. The inferred resources were 10.6 Mt (11.7 million short tons) of 0.13% molybdenum and 0.14% tungsten trioxide (SRK Consulting (USA) Inc., 2008, p. 134). Exploration continued in 2009 to refine these results. The Victorio Mountains deposit consisted of molybdenum, tungsten and beryllium skarns, and carbonate hosted deposits associated with Tertiary intrusions (McLemore and others, 2000a, p. 267).

Polymetallic Deposits.—Southern Silver Exploration Corp. acquired mining claims for its Oro project (gold, silver, copper, lead, and zinc) in the Eureka mining district in Hidalgo County. In June, drill permits were granted by the State and the Bureau of Land Management for 10 drill sites (Southern Silver Exploration, 2009a). In December, the company announced that drilling would begin in January 2010 and would focus on four separate gold-rich targets (Southern Silver Exploration, 2009b).

Historically, approximately 230 t (500,000 pounds) of copper, 155 kg (5,000 troy ounces) of gold, almost 14,000 kg (450,000 troy ounces) of silver, more than 1,300 t (2.9 million pounds) of lead, and 771 t (1.7 million pounds) of zinc were produced from polymetallic veins and skarn deposits in the Eureka district from 1880–1961 (McLemore and others, 2000b). Turquoise also is found in the district.

Commodity Review

Industrial Minerals

Cement.—Portland and masonry cement is produced at Tijeras cement plant near Albuquerque, which was operated by Grupos Cementos de Chihuahua (GCC); the estimated capacity was 800,000 metric tons per year (t/yr) of cement. The Tijeras cement plant was commissioned in 1959, and GCC took over operations in 1994. The raw material used to make cement is limestone mined at Tijeras, with additional varying quantities of alumina, gypsum, iron ore, and sandstone/shale (locally obtained from throughout New Mexico).

Clays.—Common clay and fire clay were mined in New Mexico. Common clay was used in the manufacture of bricks, quarry tile, and roofing granules. Commercial adobe yards are mostly in northern New Mexico, and bricks are manufactured at the Kinney Brick Mill Co.'s plant in Albuquerque and American Eagle Brick Co's. plant in Sunland Park, Dona Ana County.

Gemstones.—Gemstones and semiprecious stones produced in the State included agate, azurite, fluorite, geodes, moonstone, onyx, peridot, smithsonite, and turquoise. However, depletion of the known deposits and difficulty in and expense of adhering to Federal, State, and local environmental regulations have closed most of the commercial mines. In New Mexico, peridot (a gem variety of olivine) can be found at three different locations—Buell Park, McKinley County, and in the Kilbourne Hole and the Potrillo Mar depression, Dona Ana County. Other examples of gemstone resources were turquoise, found in the Little Hatchet Mountains in Hidalgo County and near Orogrande, Otero County, and fluorite and other minerals at Bingham, Hansonburg District, in Socorro County.

Other smaller gypsum mines were operated in Dona Ana and Sandoval Counties. The Alley Gypsum Mine, located in Dona Ana County, began mining gypsum as agricultural amendment in November 2008 (New Mexico Energy, Minerals and Natural Resources, 2009). Gypsum was primarily used in the manufacture of wallboard for homes, offices, and commercial

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buildings, as well as in the manufacture of portland and masonry cement and plasters; it was also used as a soil conditioner.

Perlite.—Perlite is weathered (hydrated), natural glass that is formed by the rapid cooling of viscous, high-silica rhyolite lava. The distinguishing feature of perlite from other volcanic glasses is that when heated above 871°C, it expands or pops to 4 to 20 times its original volume to form a lightweight glass foam. This expansion is due to the presence of 2% to 6% combined water in the mined perlite. While the mined, crude perlite may range from waxy to pearly, light gray to black or even brown, blue, or red, the color of expanded perlite ranges from snowy white to grayish white. Perlite is used in building construction products, horticultural aggregate, filter aid, fillers, and other applications.

In New Mexico, perlite is found in high-silica rhyolite lava flows and lava domes that are typically 3.3 to 7.8 million years old (Chamberlin and Barker, 1996; Barker and others, 1996). Perlite is produced from three mines in New Mexico: Socorro, El Grande, and No Agua (Chamberlin and Barker, 1996).

Potash.—The Carlsbad potash district is the largest potash-producing area in the United States. Intrepid Mining LLC and Mosaic Co. operate mines in the district. Potash is used as fertilizer and as a chemical in specialty and industrial markets. Langbeinite (potassium magnesium sulfate ($K_2SO_4(MgSO_4)_2$)) and sylvite (KCl) were the primary potash ore minerals found in Permian evaporates of the Permian Basin in New Mexico. Mining was by underground methods at depths of about 240 to 460 m. The potash reserves in the district have been estimated to be greater than 501 Mt (553 million short tons) (Barker and others, 1996).

The production capacity of the Mosaic potash mines was about 450,000 t/yr (500,000 short tons per year) of red potash and about 1.1 Mt per year (Mt/yr) (1.2 million short tons per year) of potassium magnesium sulfate (langbeinite). The total ore reserves at Mosaic reportedly include an estimated 92 Mt (101 million short tons) of potash ore in three mining beds at thickness ranging from 1.4 to 3.4 m. These ore reserves have been estimated to yield 4.5 Mt (5 million short tons) of concentrate from sylvinite with an average grade of 60% potash (K_2O) and 16 Mt (18 million short tons) of langbeinite concentrate with an average grade of approximately 22% K_2O. These reserves are expected to last 15 to 23 years.

Intrepid Potash Inc. operated four potash properties in Carlsbad. Intrepid employs approximately 650 people in New Mexico. The West Facility, which consisted of a potash mine and refinery was originally built in 1929 by U.S. Potash and had a production capacity of approximately 490,000 t/yr of red potash. The East Facility, which consisted of a potash mine, refinery, and compaction plant, had a production capacity of approximately 510,000 t/yr of white potash. The North facility consisted of a granular compaction plant and storage facilities. Two types of ore were processed; flotation was used to produce red potash and hot-leach crystallization was used to produce the higher purity white potash. Plans were underway to produce potash by solution mining at the HB Solar Solution Mine. This mine had operated as an underground mine by a previous owner until 1997.

Pumice.—The main use for pumice was as an aggregate in lightweight building blocks and assorted building products. Other major applications for pumice and pumicite included abrasive, absorbent, concrete aggregate and admixture, filter aid, horticulture (including landscaping), and the stonewashing of denim.

Pumice was found in the Jemez Mountains and in the Mogollon-Datil volcanic field (Hoffer, 1994, p. 12–15); however, only four operations were active in New Mexico in 2009—Copar Pumice's El Cajete Mines and the San Ysidro plant, CR Minerals Co.'s Rocky Mountain Mine and Santa Fe plant, Utility Block's U.S. Forest Service Mine and Unity Block mill, and Urban Trucking and Excavating's operation in Sandoval County.

Copar Pumice Company, Inc. has been in the pumice mining industry for more than 40 years and produced pumice from two quarries, the Guaje Canyon Mine, Los Alamos County, and El Cajete Mine, Sandoval County. The El Cajete pumice mine opened in 1997; reclamation will and has taken place as mining is completed in specific areas. Reserves were estimated at about 91,000 t (100,000 short tons) of pumice that will be used in making stonewashed jeans and building blocks. In Sandoval County, Urban Trucking and Excavating began mining pumice in April 2008 (New Mexico Energy, Minerals and Natural Resources Department, 2009).

Salt.—United Salt Corp. operated a solar evaporation salt plant near Carlsbad City in 2009. United harvested the salt from a 1,050-hectare (ha) salt lake after the sun and wind had evaporated the water from the brine. Following thorough washing, the salt was packaged as solar salt for use in agricultural feed products, for chemical feed stocks, for swimming pool chlorine generation, for water conditioning, and for numerous other industrial applications. New Mexico Salt and Minerals Corp. also produced solar salt from a facility in the Carlsbad area. Originally, the salt at Carlsbad City was sold mostly as deicing salt for roads, but contemporary uses included water conditioning, agricultural feed products, chemical feed stocks, for swimming pool chlorine generation, and numerous other industrial applications.

Zeolites.—Zeolites are minerals found disseminated in altered volcanic ash. Clinoptilolite is the predominant mineral with unique physical, chemical, and cation exchange properties for uses in agriculture, industrial, and environmental applications. Markets included odor control and hygiene products (cat litter), industrial fillers and absorbents, filtration media, environmental products, animal-feed supplements, soil conditioners, floor-drying agents, mineral fillers, water and wastewater treatment, air-filtration media, and cation exchanged products.

Clinoptilolite was found in the altered Tertiary tuff of Little Mineral Creek (White and others, 1996). Clinoptilolite was mined, crushed, dried, and sized without beneficiation and shipped packaged to meet customer's specifications. Zeolites were produced at two mines in New Mexico: St. Cloud Mining Co.'s Stone House zeolite mine and Coyote Cliff's Nos. 1 and 2 mines (New Mexico Energy, Minerals and Natural Resources Department, 2009).

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St. Cloud Mining Co. (a subsidiary of Imagin Minerals, Inc.) operates the largest zeolite mine in the United States at the Stone House Mine in Sierra County. Imagin Minerals, Inc. bought St. Cloud from The Goldfield Corporation in December 2002. St. Cloud has operated the open pit mine since 1993. The mining property consisted of approximately 607 ha (1,500 acres) and contained more than 16.6 Mt (18.3 million short tons) of reserves with a yearly capacity of almost 91,000 t (100,000 short tons). The company also made several modifications to its zeolite operation, including the addition of cation exchange capacity for added-value products and additional classification capabilities to expand markets for their products. The modern facility had a crushing and sizing capacity of about 450 t per day (500 short tons per day).

Other Industrial Minerals

New Mexico has significant deposits of humate, predominantly in the Fruitland and Menefee formations in the eastern San Juan Basin. Humates are weathered coal or highly organic mudstones found in the coal-bearing sequences. Humate was produced from nine mines and mills in the State: Rammsco's Eagle Mesa Mine near Cuba, Morningstar's Minerals Corp.'s San Juan mill in San Juan County, Horizon Ag-Products' San Luis Mine and mill south of Cuba, Mesa Verde Resources' Star Lake Mine and San Ysidro Mill, Menefee Mining Corp.'s open pit Star Lake Mine and Menefee mill, and U-Mate International's U-Mate Mine. The mining operations, processing site, and transportation facility of U-Mate International Inc. was located in the Gallup area. Humate was used as a soil conditioner and as an additive to drilling muds (Hoffman and others, 1996). Approximately 11 billion metric tons of humate resources were within the San Juan Basin (Hoffman and others, 1996).

Freeport-McMoRan Copper & Gold Inc. continued to ship magnetite (for use in cement manufacture and other minor uses) from the stockpiles at the Cobre Mining Co.'s Continental Mine.

Small flagstone dimension stone operations, located throughout the State, produced sandstone, travertine, and other ornamental rock. The largest was the New Mexico Travertine, Inc., a fully integrated stone processing plant located near Belen in Valencia County. New Mexico Travertine produced travertine for dimension stone from the Lucero quarry in Valencia County.

Metals

Copper.—Freeport-McMoRan Copper and Gold Inc., the only copper producer in New Mexico in 2009, continued to leach copper at the Chino Mine in Santa Rita, after suspending mining and milling operations at Chino in December 2008 (Freeport-McMoran Copper & Gold Inc., 2009b, p. 9). The Chino Mine was the largest porphyry copper deposit in New Mexico and has operated since 1910. Copper sulfides (chalcocite and chalcopyrite), along with azurite and chrysocolla, were found in fractured granodiorite and adjacent sedimentary rocks. In 2009, the company produced 16,300 t (36 million pounds) of copper from the SX/EW plant. Proven and probable leaching reserves in 2009 at the Chino Mine were 82 Mt of ore grading at 0.39% copper; proven and probable millable reserves were 60 Mt of ore grading at 0.65% copper, 0.03 grams per metric ton (g/t) gold, 0.48 g/t silver, and 0.013% molybdenum (Freeport-McMoRan Copper & Gold Inc., 2009a). The company continued reclamation activities of the inactive areas of the Chino Mine.

The Tyrone porphyry copper deposit in the Burro Mountains occurs within a quartz monzonite laccolith and adjacent Proterozoic rocks. Several ore bodies, sometimes considered to be separate porphyry copper deposits, have been found and mined by open pit methods in these mountains. The concentrator processed approximately 270 Mt (300 million short tons) of ore grading at 0.81% copper from 1969 to 1992, when the mill closed and the mine began processing only leach material. Currently, Tyrone consists of a SX/EW plant with a capacity to produce 76,200 Mt/yr (168 million pounds per year) of copper cathode. In 2009, more than 36,000 t (80 million pounds) of copper by SX/EW was produced. Proven leaching reserves were 180 Mt of ore grading at 0.3% recoverable copper (Freeport-McMoRan Copper & Gold Inc., 2009a, p. 104). The Tyrone Mine was among the lowest grade ore bodies operated by Freeport-McMoRan. At yearend 2008, the company announced a 50% reduction in the mining rate; however, by yearend 2009, the company reported that operations were restored to 80% of capacity (Freeport-McMoRan, 2009b, p. 9).

Freeport-McMoRan estimated its Cobre Mine reserves to be about 73 Mt of ore grading at 0.39% copper (Freeport-McMoRan Copper & Gold Inc., 2009a, p. 104). Most of the copper reserves at the Cobre Mine, consisting of a porphyry copper deposit and adjacent skarn deposits, were in the Syrena and upper part of the Lake Valley limestones north of the Barringer fault.

Gold and Silver.—In 2009, production began at New Mexico's first new gold-silver mine since 1993, the Summit Mine in the Steeple Rock District, Grant County, operated by Santa Fe Gold Corp. In years prior, all gold and silver production in the State had been byproduct recovered from copper refining by Freeport-McMoRan. The Summit Mine was a volcanic-epithermal deposit similar to the Carlisle and Center Mines also in the Steeple Rock District, Grant County (McLemore, 2008). Reserves were 480,000 t (almost 532,000 short tons) of ore grading at approximately 4.4 g/t (0.129 troy ounces per short ton) gold and almost 290 g/t (8.6 troy ounces per short ton) silver (Santa Fe Gold Corp., 2012). The company had previously purchased a ball mill and flotation plant in Lordsburg, Hidalgo County, to process the Summit ore; the permitted Banner mill was expected to begin operations in early 2010. In October, the company received the necessary permits to begin construction of a tailings disposal impoundment at the mill site; construction was finished at yearend.

Molybdenum.—In New Mexico, molybdenum was produced from Chevron Corp.'s Questa Mine in Taos County. Molybdenum is a refractory metallic element used principally as an alloying agent in steel, cast iron, and superalloys to enhance hardness, strength, toughness, and wear and corrosion resistance. Molybdenum also was used in fire retardants and in catalysts, and the mineral molybdenite is used as a lubricant.

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The Questa molybdenum mine continuously operated from 1923 through 1986 when soft market conditions caused the temporary shutdown of the mine until 1989. Mining operations again were placed on standby in 1992 and resumed in 1995.

The company mined approximately 73 Mt (81 million short tons) of ore from its open pit at a grade of 0.191% molybdenum between 1965 until 1983. Underground block caving of ore commenced in 1983 and continued throughout 2009. In 2009, production was almost 227 t (0.5 million pounds) of molybdenum, down from 2,040 t (4.5 million pounds) in 2008 (Chevron Corp., 2009).

With demonstrated reserves considered, mine life was expected to be 25 to 35 years; when inferred resources are included, the mine life could be as much as 50 to 80 years. Chevron also continued with a reclamation and revegetation program to cover overburden rock piles at the inactive open pit site. The company began construction of a solar facility on the Questa tailings site in 2009. In December 2008, the company completed funding for a research project at New Mexico Tech to evaluate the effects of weathering on the long-term slope stability of the waste rock piles; results of the specific reports and theses can be obtained from http://geoinfo.nmt.edu/staff/mclemore/projects/environment/home.html.

Mine Reclamation

In 2009, the New Mexico Energy, Minerals and Natural Resources Department continued to oversee the New Mexico Mining Act of 1993. As of December 2009, more than 10,300 ha (more than 25,500 acres) of land have been disturbed by mining activities and almost 2,100 ha (more than 5,100 acres) of that disturbance has been reclaimed under the act (New Mexico Energy, Minerals and Natural Resources Department, 2010b).

Legislation and Governmental Affairs

The State continued to be an active participant in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grants program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. In 2009, the New Mexico STATEMAP program completed 12.5 quadrangles, including quadrangles in the Grants uranium mining district and Nogal and Capitan mining districts. The Geologic Map of the Albuquerque-Rio Rancho metropolitan area and vicinity, Bernallilo and Sandoval Counties, New Mexico, had been released in 2008. The NMBGMR periodical Earth Matters featured an article on The New Mexico Library of Subsurface Data, which includes drill cores, cuttings, geophysical well logs, and other subsurface data vital to minerals exploration (New Mexico Bureau of Geology and Mineral Resources, 2009).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW MEXICO[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	28	269	14	120	10	90
Copper[3]	108	783,000	104	734,000	56	300,000
Gemstones, natural	NA	24	NA	21	NA	21
Sand and gravel:						
Construction	18,400 r	158,000 r	14,600 r	127,000 r	14,700	118,000
Industrial	W	W	W	W	--	--
Stone:						
Crushed	7,590	56,700	7,020 r	43,400 r	6,130	40,200
Dimension	W	W	27	939	32	986
Combined values of cement, gold, gypsum (crude), helium (Grade–A), lime (2007–08), molybdenum concentrates, perlite (crude), potash, pumice and pumicite, salt, silver, zeolites, and values indicated by symbol W	XX	582,000 r	XX	720,000	XX	427,000
Total	XX	1,580,000	XX	1,630,000 r	XX	886,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable. -- Zero.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Recoverable content of ores, etc.

TABLE 2
NEW MEXICO: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	21 r	3,830 r	$20,400 r	19	3,690	$21,200
Volcanic cinder and scoria	6	334	3,280	6	290	2,640
Sandstone and quartzite	2	287	2,450	3	208	1,630
Miscellaneous stone	22 r	2,570 r	17,300 r	20	1,940	14,800
Total	XX	7,020 r	43,400 r	XX	6,130	40,200

rRevised. XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch), riprap and jetty stone	W	W
Coarse aggregate graded:		
Concrete aggregate, coarse	137	1,630
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	585	1,930
Fine aggregate (-⅜ inch):		
Stone sand, concrete	111	1,240
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Coarse and fine aggregates:		
Graded road base or subbase	230	2,190
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	64	1,090
Special, asphalt fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	2	40
Unspecified:[2]		
Reported	109	580
Estimated	3,950	22,900
Total	6,130	40,200

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
NEW MEXICO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	--	--
Coarse aggregate, graded[3]	1,220	7,570	W	W	--	--
Fine aggregate (-⅜ inch)[4]	W	W	129	1,310	--	--
Coarse and fine aggregate[5]	W	W	105	1,270	--	--
Special[6]	--	--	W	W	--	--
Other miscellaneous uses	--	--	2	40	--	--
Unspecified:[7]						
Reported	1	4	75	550	33	27
Estimated	2,060	10,200	1,890	12,700	--	--
Total	3,570	20,900	2,530	19,300	33	27

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes riprap and jetty stone.
[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete railroad ballast, aggregate (coarse), and other graded coarse aggregate.
[4]Includes screening (undesignated), stone sand (bituminous mix or seal), and stone sand (concrete).
[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes asphalt fillers or extenders.
[7]Reported and estimated production without a breakdown by end use.

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TABLE 5
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,350	$13,200	$9.83
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	245	2,160	8.83
Asphaltic concrete aggregates and other bituminous mixtures	1,240	13,100	10.57
Road base and coverings[3]	1,510	9,530	6.32
Fill	362	1,170	3.23
Other miscellaneous uses[4]	91	2,530	27.78
Unspecified:[5]			
Reported	2,330	9,270	3.98
Estimated	7,600	66,600	8.76
Total or average	14,700	118,000	7.99

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement).
[4]Includes railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

TABLE 6
NEW MEXICO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	1,130	11,400	459	4,040	--	--
Asphaltic concrete aggregates and other bituminous mixtures	W	W	W	W	311	3,550
Road base and coverings[3]	836	5,390	360	2,170	311	1,970
Fill	117	645	245	525	--	--
Other miscellaneous uses[4]	921	10,500	97	1,560	--	--
Unspecified:[5]						
Reported	899	6,080	45	288	1,390	2,900
Estimated	5,530	49,500	2,070	17,100	--	--
Total	9,440	83,500	3,270	25,700	2,010	8,430

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement).
[4]Includes railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

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NEW YORK

Source: New York State Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF NEW YORK

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the New York State Geological Survey for collecting information on all nonfuel minerals.

In 2009, New York's nonfuel raw mineral production[1] was valued at $1.37 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $106 million, or nearly 7.2%, decrease from the total value for 2008, which was down by $78.3 million, or more than 5%, from 2007 to 2008. The State rose in rank to 15th from 16th among the 50 States in total nonfuel mineral production value, while accounting for 2.3% of the U.S. total value.

In 2009, by production value, salt remained New York's leading nonfuel mineral commodity, followed by crushed stone, and construction sand and gravel. The combined values of these three leading mineral commodities accounted for more than 80% of the State's nonfuel mineral production value. Those mineral commodities that increased in production value were led by crushed stone, up $25.6 million, or nearly 7%. Significant increases also took place in dimension stone, up $12.2 million; construction sand and gravel, up $7 million; and common clays, up $2 million. Other mineral commodities that increased in value were industrial sand and gravel and natural gemstone. Significant decreases in production value took place in masonry cement, portland cement, and peat. Decreases also took place in industrial garnet and wollastonite. A smaller, yet significant, decrease took place in salt, down by $5.1 million, or 1.2%.

In 2009, New York continued to be the only State to produce wollastonite. The State also remained second in rank in industrial garnet production and third in the production of salt. The State rose in rank to 6th from 10th in construction sand and gravel, to 6th from 9th in common clays, to 6th from 9th in dimension stone, and to 14th from16th in crushed stone production. New York remained a significant producer of masonry cement, portland cement, and peat.

In 2009, New York produced raw steel and primary aluminum, feeds for which were obtained from foreign and (or) other domestic sources. Continuing the trend of the past 3 years, the State remained sixth in aluminum production among 11 producing States.

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NEW YORK[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	699	28,500	745	28,200	605	30,200
Gemstones, natural	NA	96	NA	96	NA	97
Salt	7,990	400,000	7,660	431,000	6,240	426,000
Sand and gravel, construction	34,300 r	286,000 r	34,400 r	260,000 r	31,100	266,000
Stone:						
Crushed	47,300	432,000	41,000 r	384,000 r	37,200	410,000
Dimension	70	12,000	57	16,000	97	28,200
Combined values of cadmium [byproduct from zinc concentrates (2007–08)], cement, garnet (industrial), peat, sand and gravel (industrial), talc [crude (2007–08)], wollastonite, zinc (2007–08)	XX	393,000	XX	354,000	XX	207,000
Total	XX	1,550,000	XX	1,470,000 r	XX	1,370,000

r Revised. NA Not available. XX Not applicable.

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2] Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
NEW YORK: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	61 r	21,200 r	$209,000 r	66	19,400	$195,000
Dolomite	18	10,100	84,100	16	9,870	114,000
Marble	2	106	1,040	2	96	950
Granite	8	1,190	13,500	8	1,110	13,300
Traprock	3	4,110	28,500	3	2,840	45,200
Sandstone and quartzite	14	2,350	27,800	16	2,190	24,400
Slate	3	122	1,180	3	167	1,640
Miscellaneous stone	23 r	1,880 r	19,300 r	38	1,520	15,900
Total	XX	41,000 r	384,000 r	XX	37,200	410,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
NEW YORK: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	157	1,960
Filter stone	62	689
Other coarse aggregate	1,320	17,500
Coarse aggregate, graded:		
Concrete aggregate, coarse	688	6,310
Bituminous aggregate, coarse	546	5,880
Bituminous surface-treatment aggregate	568	5,710
Railroad ballast	53	516
Other graded coarse aggregate	4,930	64,800
Fine aggregate (-⅜ inch):		
Stone sand, concrete	192	1,830
Stone sand, bituminous mix or seal	324	3,720
Screening, undesignated	228	2,170
Other fine aggregate	5,170	72,300
Coarse and fine aggregates:		
Graded road base or subbase	815	9,600
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	2,720	21,900
Other coarse and fine aggregates	985	13,800
Other construction materials	349	3,190
Agricultural, limestone	101	1,140
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3—Continued
NEW YORK: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Other miscellaneous uses and specified uses not listed	4	26
Unspecified:[2]		
Reported	7,680	80,300
Estimated	9,590	89,500
Total	37,200	410,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
NEW YORK: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

	District 2		District 3		District 4		District 5	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[3]	W	W	W	W	132	1,450	W	W
Coarse aggregate, graded[4]	W	W	W	W	1,230	12,500	W	W
Fine aggregate (-⅜ inch)[5]	W	W	W	W	379	4,130	W	W
Coarse and fine aggregate[6]	576	7,940	658	7,030	1,200	12,000	W	W
Other construction materials	--	--	340	3,130	--	--	--	--
Agricultural[7]	W	W	--	--	W	W	W	W
Chemical and metallurgical[8]	--	--	W	W	W	W	--	--
Other miscellaneous uses	--	--	--	--	--	--	--	--
Unspecified:[9]								
Reported	180	2,080	--	--	285	2,860	1,690	17,000
Estimated	809	9,150	1,470	15,300	1,930	17,800	1,750	13,400
Total	9,710	136,000	4,940	55,100	5,230	51,500	4,670	42,200

	District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[3]	W	W	W	W	--	--
Coarse aggregate, graded[4]	W	W	W	W	--	--
Fine aggregate (-⅜ inch)[5]	W	W	W	W	--	--
Coarse and fine aggregate[6]	W	W	W	W	--	--
Other construction materials	--	--	8	66	--	--
Agricultural[7]	--	--	W	W	--	--
Chemical and metallurgical[8]	--	--	--	--	--	--
Other miscellaneous uses	4	26	--	--	--	--
Unspecified:[9]						
Reported	1,990	19,900	2,110	21,200	1,430	17,200
Estimated	1,430	14,500	591	5,820	1,600	13,500
Total	4,360	45,300	5,230	49,000	3,030	30,800

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]No production for District 1.
[3]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
[4]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[5]Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.
[6]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.
[7]Includes limestone.
[8]Includes cement and lime manufacture.
[9]Reported and estimated production without a breakdown by end use.

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TABLE 5
NEW YORK: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	3,130	$31,800	$10.15
Plaster and gunite sands	381	5,060	13.28
Concrete products (blocks, bricks, pipe, decorative, etc.)	107	627	5.86
Asphaltic concrete aggregates and other bituminous mixtures	863	8,450	9.79
Road base and coverings[2]	2,990	18,000	6.04
Fill	1,790	9,190	5.13
Snow and ice control	797	4,590	5.76
Railroad ballast	92	850	9.24
Filtration	15	92	6.13
Other miscellaneous uses	144	957	6.65
Unspecified:[3]			
Reported	4,030	41,300	10.24
Estimated	16,800	146,000	8.68
Total or average	31,100	266,000	8.56

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (cement and lime).
[3]Reported and estimated production without a breakdown by end use.

TABLE 6
NEW YORK: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	1,080	12,200	258	4,130	609	6,220
Asphaltic concrete aggregates and road base materials[3]	W	W	176	2,890	W	W
Fill	W	W	24	192	477	1,690
Snow and ice control	W	W	58	632	247	1,580
Other miscellaneous uses[4]	38	316	82	832	1,160	7,930
Unspecified:[5]						
Reported	1,740	20,000	92	1,350	--	--
Estimated	800	10,000	1,990	17,500	665	5,750
Total	3,660	42,500	2,680	27,500	3,160	23,200
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	197	1,420	231	2,120	664	6,710
Asphaltic concrete aggregates and road base materials[3]	W	W	278	2,170	1,180	7,100
Fill	707	4,480	144	588	W	W
Snow and ice control	W	W	86	488	151	547
Other miscellaneous uses[4]	411	2,170	21	67	217	1,140
Unspecified:[5]						
Reported	4	17	122	1,030	376	3,420
Estimated	1,300	11,600	917	7,830	3,430	27,600
Total	2,620	19,700	1,800	14,300	6,010	46,500

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement and lime).
[4]Includes filtration and railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

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TABLE 6—Continued
NEW YORK: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

	District 7		District 8	
	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	439	3,650	147	1,050
Asphaltic concrete aggregates and road base materials[3]	651	4,490	152	827
Fill	76	498	161	716
Snow and ice control	90	370	W	W
Other miscellaneous uses[4]	72	337	32	111
Unspecified:[5]				
Reported	1,260	11,800	436	3,690
Estimated	3,230	27,900	4,450	37,400
Total	5,810	49,000	5,380	43,800

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration and railroad ballast.

[5]Reported and estimated production without a breakdown by end use.

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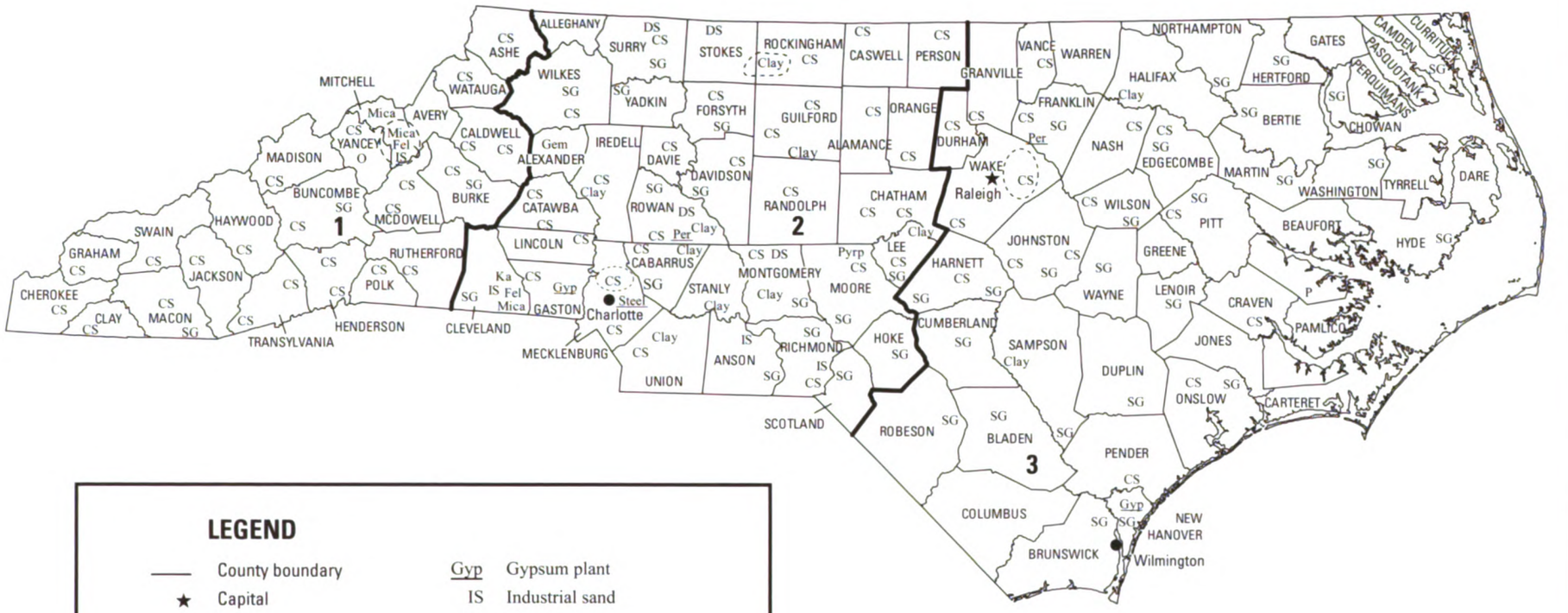
NORTH CAROLINA



LEGEND

——	County boundary
★	Capital
●	City
1——	Crushed stone and sand and gravel boundary

MINERAL SYMBOLS
(Principal producing areas)

Clay	Common clay
CS	Crushed stone
DS	Dimension stone
Fel	Feldspar
Gem	Gemstones
Gyp	Gypsum plant
IS	Industrial sand
Ka	Kaolin
Mica	Mica
Per	Perlite plant
P	Phosphate rock
O	Olivine
Pyrp	Pyrophyllite
SG	Construction sand and gravel
Steel	Steel plant
⬭	Concentration of mineral operations

Source: North Carolina Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF NORTH CAROLINA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the North Carolina Geological Survey for collecting information on all nonfuel minerals.

In 2009, North Carolina's nonfuel raw mineral production was valued at $846 million, based upon annual U.S. Geological Survey (USGS) data. This was a $244 million, or 22%, decrease from the State's total nonfuel mineral production value of $1.09 billion in 2008, which was down by $80 million, or almost 7%, from that of 2007. In 2009, North Carolina accounted for 1.4% of the U.S. total nonfuel mineral production value, and the State decreased in rank among the 50 States to 24th from 23d in 2008, which in turn was down from 21st in 2007.

North Carolina's leading nonfuel mineral commodity by value continued to be crushed stone, accounting for 69% of the State's total nonfuel mineral production value in 2009, down from almost 74% of the State's total production value in 2008. It was followed by (in descending order of value), phosphate rock, construction sand and gravel, industrial sand and gravel, dimension stone, and feldspar. Combined, these six commodities accounted for almost 98% of North Carolina's total nonfuel mineral production value.

The only mineral commodity to show an increase in production value in 2009 was phosphate rock, which increased significantly in value, slightly offsetting the overall decrease in North Carolina's mineral industry. The mineral commodity rose by more than 9.4% in value in 2009 (actual value withheld—company proprietary data). The largest increase in unit value took place with crude mica, increasing by about 33%, and the largest decrease in unit value took place with common clays, falling by 41%.

The largest decreases in value were in crushed stone, down from $806 million in 2008 to $584 million in 2009, or $222 million; construction sand and gravel, down by almost $16 million; common clay, down by $7.9 million; and dimension stone, down by $2.9 million. The decline in U.S. construction markets from 2007–08 was responsible for the significant declines in the production values of these four industrial mineral commodities. The largest decrease in total production took place in crushed stone, which was down by 19 million metric tons (Mt) to 38.5 Mt in 2009 from 57.5 Mt in 2008, or 33%, which in turn was down from 70.2 Mt in 2007, or 18%.

North Carolina continued to be the only andalusite producer in the United States and ranked first in the amount of feldspar produced among the seven feldspar-producing States—its rank since at least 1994. Since 2004, North Carolina had been the only pyrophyllite producer in the United States; however, in 2009, California resumed production of pyrophyllite. North Carolina continued to be the leading pyrophyllite producer in 2009. For the third consecutive year, the State continued to rank second of two olivine-producing States, behind Washington. The State continued to rank second of four phosphate rock-producing States since 2005, third in the production of common clays since 2007, and eighth in kaolin production. North Carolina dropped in rank from 6th to 8th in industrial sand and gravel, from 7th to 8th in dimension stone, and from 7th to 13th in crushed stone production.

The following narrative information was provided by the North Carolina Geological Survey (NCGS), a State government agency within the Division of Land Resources (DLR) of the North Carolina Department of Environment and Natural Resources (NCDENR).

Commodity Review

Industrial Minerals

Gemstones, Emeralds.—No large emeralds were reported in 2009. However, low-quality emeralds continue to be found in the Hiddenite District, Alexander County.

Feldspar and Quartz.—Plans remained in place to rebuild Unimin Corporation's Spruce Pine quartz plant after it suffered substantial fire damage in late November 2008.

Phosphate Rock.—In June, 2009, after nearly 9 years of effort, Potash Corp. of Saskatchewan Inc. (Saskatoon, Saskatchewan, Canada) received a Clean Water Act (CWA) Section 404 permit from the U.S. Army Corps of Engineers (USACE), authorizing recovery of phosphate resources adjacent to its current mining operation in Aurora, Beaufort County. The permit provides continued mining operation for at least 35 years (U.S. Army Corps of Engineers, 2009, p. 52).

The official permit application was submitted to the USACE in November 2000. The CWA established requirements for activities that may affect water quality, wetlands, or streams. A majority of the land in eastern North Carolina was historically wetlands, including the area encompassed by the permit application. Federal and State agencies, led by USACE and NCDENR—Division of Water Quality (DWQ), as well as nongovernmental organizations, including the Pamlico-Tar River Foundation (PTRF) and Environmental Defense (ED), participated in the review team, meeting with Potash Corp. representatives on more than 20 occasions, beginning in 2001.

In addition to the Section 404 permit, other required Federal authorizations included a Section 401 Water Quality certification and National Pollutant Discharge Elimination System permit from the U.S. Environmental Protection Agency. Required North Carolina permits included a Coastal Zone Consistency Concurrence, as required by the Federal Coastal Zone Management Act (but granted by the North Carolina Division of Coastal Management), a Coastal Area Management Act permit, mining permit, Erosion and Sediment Control Plan approval, stream-buffer rule permit, storm-water permit, and a Capacity Use Area permit. A Special Use permit from the town of Aurora was also required.

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Metals

Lithium.—North Arrow Minerals Inc. (Vancouver, British Columbia, Canada) drilled 12 holes, totaling approximately 1,240 meters (approximately 4,000 feet) of coring, at its Beaverdam project in North Carolina's tin-spodumene belt, a historically important lithium-producing area. The project was located north and along the strike of the Kings Mountain Mine, owned by Chemetall Foote Corp. (a subsidiary of Chemetall, which was owned by Rockwood Holdings Inc., Princeton, NJ), and the Hallman-Beam Mine, owned by FMC Lithium (a subsidiary of FMC Corp.). These two lithium mines began production in the 1950s. A summary of the 2009 drilling data was available on North Arrow Minerals' Web site and the company planned additional diamond drilling for the spring and summer of 2010 (North Arrow Minerals Inc., 2009).

Government Activities and Programs

State Government

Mine Permitting.—In support of the Land Quality Section (LQS) of DLR's Mining Program, the NCGS continued to review applications to open, modify, renew, or release mines and mining permits in 2009. The permitted active and inactive mine inventory is continually updated with the revised listings posted in June and December on the LQS Web site at portal.ncdenr.org/web/lr/land-quality.

Natural Gas Evaluation.—NCGS staff continued to study and to evaluate potential natural gas resources in the State's Mesozoic rift basins (Reid, 2009). Particular emphasis was placed on the Sanford subbasin of the Deep River Basin, which is primarily located in Lee and Chatham Counties, approximately 56 km southwest from Raleigh (Reid and Taylor, 2009a, b).

The North Carolina Geological Survey.—Geologic mapping continued in the Blue Ridge Mountains and in the northeast Piedmont physiographic provinces of North Carolina. Landslide mapping inventory continued in Henderson and Jackson Counties in the western portion of the State. Information regarding North Carolina's geology, mining, mineral resources, mineral production, and topographic and geological maps is available through the NCGS Web site at www.geology.enr.state.nc.us.

North Carolina State University Minerals Research Laboratory (MRL).—The MRL, located in Asheville, NC, is a unit of North Carolina State University. During 2009, the MRL continued to focus its efforts on work, sponsored by worldwide partners, for process development of various industrial minerals. In addition, the lab researched possible uses for in-State mine tailings, analyzing over 55 samples from within the State. This project was well received by the mining community, with the objective to have the variety of mineral suites and various industrial and aggregate mineral operations producing commercialized ideas. Various industrial specialists, academics, and regulators advise MRL personnel on technical, commercial, and environmental issues concerning the project.

MRL partnered with the University of North Carolina, Asheville, to establish a Mineral Science and Processing program to generate professionals trained in the aggregate, industrial minerals, or environmental service industries. The curriculum incorporates basic science, environmental science, and mineral-processing courses with pilot-plant-scale laboratories with an objective to supply the private and public sector with young, educated, and hands-on professionals.

Industry News, Community Involvement, and Awards

On March 31, 2009, Vulcan Materials Co. announced the division of its operations into two regional business units—East and West. North Carolina was placed in the East Region that will include all of the business and product lines of the Mideast, Southeast, Southern and Gulf Coast, Southwest, Florida Rock, and North Concrete Divisions (Vulcan Materials Co., 2009).

Vulcan's Stokesdale Quarry in Winston-Salem received the National Stone, Sand and Gravel Association's 2008 Excellence in Community Relations Gold Award. The award was presented at the Annual Convention on March 9, 2009, in Orlando, FL. The Director of Business Development and External Affairs at Vulcan received the Outstanding Alumni Award for 2009 from the Department of Geology within the College of Arts and Sciences at Appalachian State University.

Vulcan Materials Co. Foundation awarded Foothills Conservancy $2,500 to support land and water conservation in the foothills of the Blue Ridge Mountains. A regional nonprofit land trust, Foothills Conservancy has protected more than 18,200 hectares (45,000 acres) since 1995 by working with landowners and community partners to preserve important natural areas and open spaces of this region, including watersheds, wildlife forests, and rural farm lands.

The Dillsboro Quarry of APAC–Harrison Division (division of Oldcastle Construction Products) became the seventh location to earn the Mining Star Award from the North Carolina Department of Labor (NCDOL). The Commissioner of Labor presented the certificate and flag during a luncheon on December 12, 2008. APAC–Harrison Division's Waynesville Quarry received the Mining Star Award in September 2007. These are the only two crushed stone operations to have received the Mining Star Award. The Mining Star Program of NCDOL began in 2003 and recognizes sites where management and employees are committed to safety and health (O'Briant, 2009).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NORTH CAROLINA[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Common	1,720	19,500	1,260	12,900	828	4,980
Kaolin	20	792	15	W	9	W
Gemstones, natural	NA	384	NA	659	NA	360
Mica, crude	43	10,300	22	4,580	16	4,430
Sand and gravel:						
Construction	11,500 r	62,900 r	9,770 r	58,800 r	7,570	43,000
Industrial	1,670	31,300	1,510 r	29,400	1,300	28,000
Stone:						
Crushed	70,200	898,000	57,500	806,000	38,500	584,000
Dimension	48	20,400	58	25,200	62	22,300
Combined values of andalusite, feldspar, olivine, phosphate rock, pyrophyllite (crude), and values indicated by symbol W	XX	131,000	XX	150,000 r	XX	160,000
Total	XX	1,170,000	XX	1,090,000	XX	846,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NORTH CAROLINA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	14	6,310	$86,600	15	4,110	$59,400
Granite	85	41,500	585,000	84	28,300	432,000
Traprock	7	8,240	115,000	7	4,290	66,300
Slate	-- r	-- r	-- r	--	--	--
Miscellaneous stone	6 r	1,390 r	19,800 r	7	1,810	26,300
Total	XX	57,500	806,000	XX	38,500	584,000

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
NORTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	127	2,350
Filter stone	154	3,440
Other coarse aggregate	265	5,780
Coarse aggregate, graded:		
Concrete aggregate, coarse	923	14,400
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	340	9,000
Railroad ballast	711	8,990
Other graded coarse aggregate	3,160	59,300
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	574	8,510
Other fine aggregate	1,300	17,600
Coarse and fine aggregates:		
Graded road base or subbase	1,320	22,100
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	774	9,730
Other coarse and fine aggregates	3,000	43,600
Other construction materials	557	7,080
Agricultural:		
Limestone	W	W
Poultry grit and mineral food	W	W
Special, whiting or whiting substitute	W	W
Other miscellaneous uses and specified uses not listed	18	164
Unspecified:[2]		
Reported	20,300	299,000
Estimated	4,610	65,900
Total	38,500	584,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
NORTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregate[5]	1,400	21,900	W	W	W	W
Other construction materials	--	--	557	7,080	--	--
Agricultural[6]	W	W	4	326	W	W
Special[7]	W	W	--	--	--	--
Unspecified:[8]						
Reported	503	6,430	10,600	153,000	9,170	139,000
Estimated	2,820	41,900	1,110	14,800	669	9,220
Total	6,750	105,000	18,500	272,000	13,300	206,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone and poultry grit and mineral food.

[7]Includes whiting or whiting substitute.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
NORTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,910	$11,600	$6.08
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	282	1,900	6.74
Asphaltic concrete aggregates and road base materials[3]	W	W	6.30
Fill	751	2,380	3.17
Other miscellaneous uses[4]	170	1,190	6.99
Unspecified:[5]			
Reported	702	4,760	6.78
Estimated	3,760	21,200	5.64
Total or average	7,570	43,000	5.68

W Withheld to avoid disclosing company proprietary data; included in "Other miscellanous uses."

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes golf course, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6
NORTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	W	W	964	5,710	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	96	587	W	W
Fill	--	--	125	403	626	1,980
Other miscellaneous uses[4]	W	W	19	225	W	W
Unspecified:[5]						
Reported	--	--	40	251	662	4,510
Estimated	W	W	373	2,190	W	W
Total	642	3,990	1,620	9,360	5,310	29,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes golf course, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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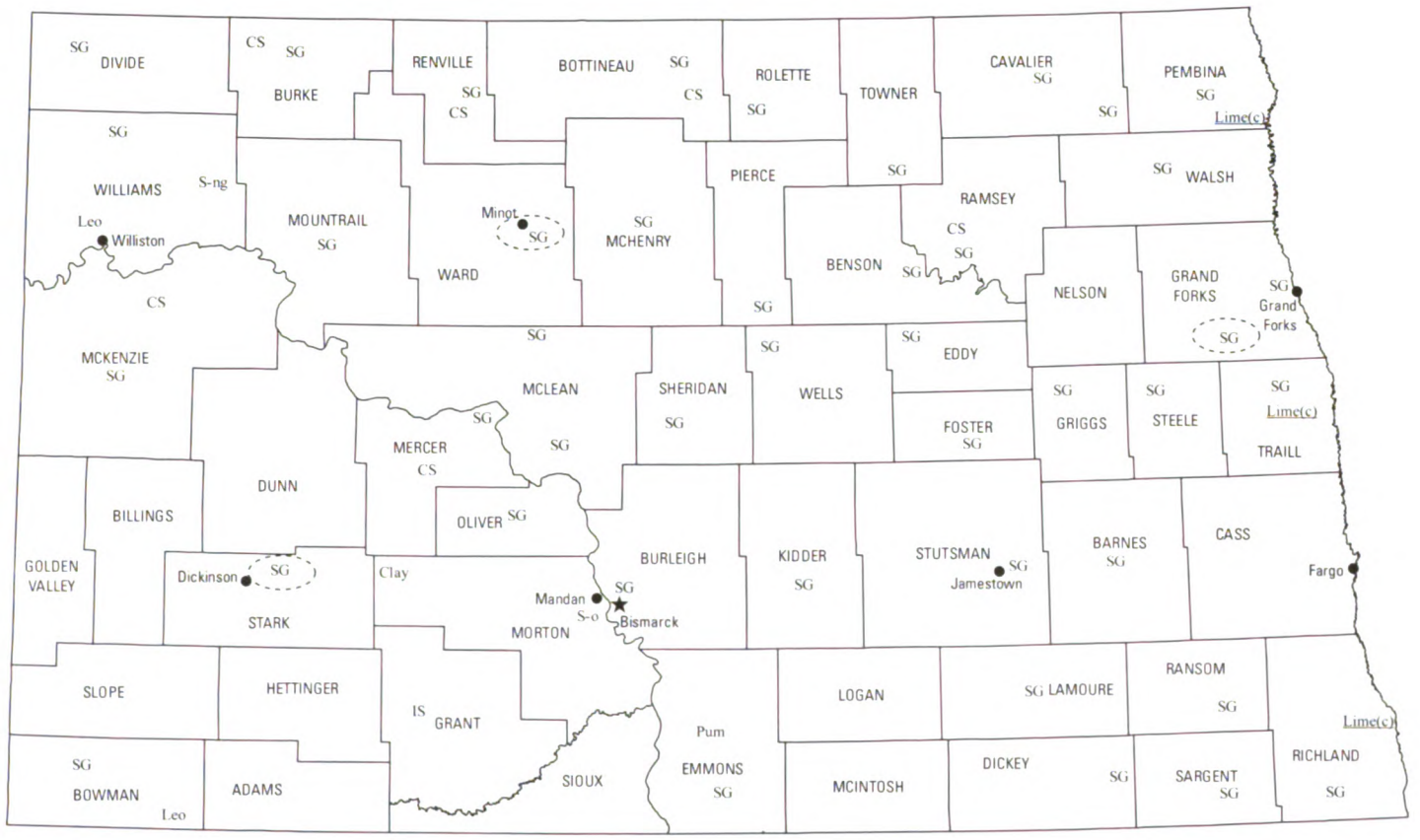
NORTH DAKOTA



LEGEND

- County boundary
- ★ Capital
- ● City

MINERAL SYMBOLS
(Principal producing areas)

Clay	Common clay
CS	Crushed stone
IS	Industrial sand
Leo	Leonardite
Lime(c)	Lime (captive)
Pum	Pumicite
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
SG	Construction sand and gravel
⬭	Concentration of mineral operations

Source: North Dakota Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF NORTH DAKOTA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the North Dakota Geological Survey for collecting information on all nonfuel minerals.

In 2009, North Dakota's nonfuel raw mineral production[1] was valued at $51 million, based upon annual U.S. Geological Survey (USGS) data. This was an $11.2 million, or 28%, increase from the State's total nonfuel mineral production value in 2008, which had decreased by nearly $11 million, or 21%, from a total of $50.6 million in 2007. (The State's actual total nonfuel mineral values for 2007–09 were significantly higher than those reported in table 1; data for common clays, lime, and industrial sand and gravel have been withheld so as to not disclose company proprietary data.)

North Dakota's leading nonfuel mineral by value of production continued to be construction sand and gravel, accounting for 92% of the State's total disclosed nonfuel mineral production value. The State ranked 19th out of 50 construction-sand-and-gravel-producing States in 2009. Lime was the second ranked mineral commodity produced in significant quantity, although for captive consumption only (actual production figure withheld—company proprietary data). In North Dakota, all lime is produced by the sugar industry for refining sugar from sugar beets. The most significant increase in production value took place in construction sand and gravel, increasing $7.8 million, or almost 20%. Production increased by 2.3 million metric tons (Mt), to 14.4 Mt in 2009 from 12.1 Mt in 2008, which had been down 2.9 Mt from a total of 15 Mt in 2007 (table 1). A significant increase took place in the production and production value of crushed stone, owing to, as reported by the North Dakota Geological Survey (NDGS), stockpiling by a local coal company. This mineral commodity saw a 959,000-metric-ton (t) increase in production from 2008 to 2009. The production value rose from $133,000 in 2008 to almost $4 million.

The following narrative information was provided by the NDGS.[2] Production data in the text that follows are those reported by the NDGS based upon that agency's own surveys and estimates.

Commodity Review

Industrial Minerals

During 2009, 15 surface mining operators in North Dakota reported information to the State Soil Conservation Committee (SSCC). The SSCC collects production data by volume, unlike the USGS, which collects data by weight or metric tons produced. Based on these reports, 72 hectares (ha) was affected. The quantity of minerals mined included 1,250,000 cubic meters (m^3) of sand and gravel, 46,000 m^3 of clay, 176,000 m^3 of scoria, and 23,000 m^3 of rock—totaling to approximately 1,500,000 m^3 of mineral material. Crushed scoria mining increased tenfold from 2008 to 2009 owing to stockpiling by a local coal mining company. A total of 250,000 m^3 of overburden was disturbed from 50 pits ranging in size from more than 0.1 to 16 ha. One-half of the clay mined in North Dakota during 2009 was mined by the Hebron Brick Company to produce brick. One-half of the clay mined for the manufacture of brick was kaolinite.

Leonardite.—Leonardite is an oxidized lignite. Leonardite Products LLC of Williston and American Colloid Company of Scranton are the only leonardite mining operations in North Dakota, although companies mining lignite encounter leonardite on a routine basis. The two companies produced a combined total of approximately 23,000 t of leonardite in 2009, down almost 80% from 110,000 t in 2008. Leonardite is processed and used as a dispersant and viscosity control in oil-well-drilling muds, as a stabilizer for ion-exchange resins in water treatment, and as a soil conditioner. In 2008, Leonardite Products purchased a processing plant and mine previously owned and operated by GeoResources, Inc.

Legislation and Government Programs

The SSCC, as designated by the State legislature, continues to administer the Surface Mining Report Law, which requires any person conducting surface mining operations for minerals other than coal to comply with the reporting requirements of North Dakota Century Code Chapter 38–16. Minerals included under the law are cement rock, clay, gravel, limestone, manganese, molybdenum, peat, potash, pumicite, salt, sand, scoria, sodium sulfate, stone, zeolites, and other minerals. The SSCC has the regulatory authority to administer the reporting requirement, while the actual regulatory authority for most of these mining activities rests with the North Dakota Department of Mineral Resources. The law requires that any person or company that removes 7,650 m^3 (10,000 cubic yards) or more of earthen materials or products (including overburden) affecting 0.2 ha (one-half acre) or more in combined mining operation within 1 calendar year must report the particulars of their surface mining activities. Some small operators cooperate by voluntarily submitting summary reports to the SSCC, although not required to by law. Nevertheless, because not all operations report, the summary of surface mining statistics presented above is a conservative estimate of the amount of nonfuel minerals mined in North Dakota in 2009. A mineral page is maintained on the Web site of the NDGS at https://www.dmr.nd.gov/ndgs/Mineral/mineralnew.asp.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Edward C. Murphy, State Geologist, authored the text of State mineral industry information provided by the North Dakota Geological Survey.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN NORTH DAKOTA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	W	W	84	549	W	W
Gemstones, natural	NA	4	NA	4	NA	4
Lime	W	W	W	W	W	W
Sand and gravel:						
Construction	15,000 r	49,400 r	12,100 r	39,200 r	14,400	47,000
Industrial	W	W	W	W	W	W
Stone, crushed	274	1,270	26	133	985	3,980
Total	XX	50,600 r	XX	39,800 r	XX	51,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
NORTH DAKOTA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Sandstone and quartzite	--	--	--	1	655	$2,310
Volcanic cinder and scoria	1	26	$133	2	294	1,490
Miscellaneous stone	--	--	--	5	36	182
Total	XX	26	133	XX	985	3,980

XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
NORTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	W	W
Filter stone	W	W
Coarse aggregate, graded, bituminous aggregate, coarse	W	W
Coarse and fine aggregates:		
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	118	360
Unspecified, reported[2]	330	1,670
Total	985	3,980

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported production without a breakdown by end use.

TABLE 4
NORTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	77	$559	$7.26
Asphaltic concrete aggregates and road base materials	4,090	11,800	2.89
Fill	241	918	3.81
Other miscellaneous uses[2]	26	198	7.62
Unspecified:[3]			
Reported	3,320	11,600	3.49
Estimated	6,600	21,900	3.33
Total or average	14,400	47,000	3.28

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes railroad ballast and snow and ice control.
[3]Reported and estimated production without a breakdown by end use.

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OHIO

LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Al	Aluminum plant
Be	Beryllium plant
Cem	Cement plant and quarry
Clay	Common clay
CS	Crushed stone
D-L	Dimension limestone
D-Sd	Dimension sandstone
FA	Ferroalloys plant
FC	Fire clay
Gyp-s	Synthetic gypsum
IS	Industrial sand
Lime	Lime plant and quarry
Mn	Manganese plant
Peat	Peat
Per	Perlite
Salt	Salt
S-o	Sulfur (oil)
SG	Construction sand and gravel
Si	Silicon metal plant
Steel	Steel plant
Ti	Titanium metal plant
TiPig	Titanium pigment plant
Ver	Vermiculite plant
⬭	Concentration of mineral operations

Source: Ohio Geological Survey/U.S. Geological Survey (2009).

Original from THE OHIO STATE UNIVERSITY

THE MINERAL INDUSTRY OF OHIO

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Ohio Department of Natural Resources, Division of Geological Survey, for collecting information on all nonfuel minerals.

In 2009, Ohio's nonfuel raw mineral production was valued[1] at $1.13 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $114-million, or 9.2%, decrease from the State's total nonfuel mineral production value of $1.25 billion in 2008, which had decreased $35 million, or 3%, from a total of $1.28 billion in 2007. The State rose to 16th from 19th in rank among the 50 States in total nonfuel raw mineral production value and accounted for 1.9% of the U.S. total value.

Crushed stone, by production value, remained Ohio's leading nonfuel mineral, followed by salt, construction sand and gravel, lime, portland cement, and industrial sand and gravel (in descending order of value). This order of leading mineral commodities remained unchanged from 2008. Crushed stone accounted for 34% of the State's total nonfuel mineral production value, about the same as for 2007 and 2008. In 2009, the largest increase in production value took place with salt, up almost 8% from 2008, though production remained essentially unchanged (actual production values withheld—company proprietary data). Dimension stone, peat, and gemstones also had increases or remained unchanged from production value totals of 2008.

The largest decrease in production and production value took place with crushed stone, down by $58 million, or 13%, from a total of $446 million in 2008 to $388 million, and with production down by 11.4 million metric tons (Mt), or 21%, from a total quantity produced of 54.1 Mt in 2008 to 42.7 Mt in 2009. Lime and portland cement were the next largest decreases in production value, down $37 million and $21 million, respectively. Lime production was down by 540,000 metric tons (t), or 33%, and portland cement production was down by 212,000 t, or 28%. Other significant decreases included common clays, construction sand and gravel, masonry cement, and industrial sand and gravel.

In 2009, Ohio continued to rank 3d in the quantity of fire clays; 4th in the quantities of common clays, lime, and salt; 9th in the quantity of crushed stone produced; 10th in the quantity of industrial sand and gravel; and 11th in the quantity of construction sand and gravel produced. Additionally, significant quantities of cement and dimension stone were produced in the State.

In 2009, the State continued to be the Nation's second leading raw steel-manufacturing State with an estimated output of almost 6.6 million metric tons (Mt), down about 55% from the nearly 14.8 Mt that was produced in 2008, which in turn was down by 8.5% from the 16.1 Mt produced in 2007, as reported by the American Iron and Steel Institute (American Iron and Steel Institute, 2010, p. 74). Notwithstanding a significant decrease in the production, Ohio remained fifth among 11 primary aluminum-producing States; the production value of aluminum produced in the State was down by 45% from that of 2008 (actual values withheld—company proprietary data). Metals produced in the State, including aluminum, beryllium, ferroalloys, raw steel, and silicon, were processed from materials received from foreign and other State domestic sources.

The Ohio Department of Natural Resources, Division of Geological Survey[2] (ODGS), provided the following narrative information based upon its own surveys and estimates[3] (Ohio Division of Geological Survey, 2010a).

Employment

In 2009, Ohio's total annual average employment for its nonfuel mineral industry was about 3,620 people (2,580 production employees and 1,040 nonproduction employees). The total wages for all employees at industrial mineral operations was $153 million, a decrease from $185 million in 2008. The average annual wage based on those employees was around $42,200 (Ohio Division of Geological Survey, 2010a, p.12).

Commodity Review

Industrial Minerals

Clay and Shale.—Belden Brick Co. was the leading producer of building brick in the State and, with four clay operations, had the greatest number of clay-producing facilities in Ohio. Several other operators produced millions of bricks and other ceramic products at plants in Columbiana (tiles), Harrison (pipe), Licking (pipe), and Marion Counties (brick). Large quantities of Ohio clay and shale continued to be used in cement manufacture, lightweight aggregate applications, and in other clay products. In 2009, based upon ODGS production and sales data and estimates, total clay and shale production was 761,000 t (Ohio Division of Geological Survey, 2010a, p. 123–127).

Salt.—Rock salt was produced from two large underground mines beneath Lake Erie near Cleveland by Cargill Inc.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Mark E. Wolfe, a Senior Geologist with the Ohio Division of Geological Survey, authored the text of the State mineral industry information provided by that State agency.

[3]Includes reported and estimated values and published production figures. Some operations reporting sales did not report a value for those sales. A countywide- or statewide-average price per ton was calculated for each industrial mineral commodity based on sales for which the value was reported. These calculated averages were used to estimate the value of the sales for which the actual values were not reported.

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(Cargill Salt Division) and Morton International Inc. These two companies were the major rock salt producers in Ohio and also operated artificial brine operations in Coventry, Summit County, and Milton, Wayne County, respectively. Two other companies operated natural brine solution operations in Madison and Newark Townships in Licking County (Ohio Division of Geological Survey, 2010a, p. 129).

Sand and Gravel, Construction.—In 2009, Shelly Materials Inc. (Thornville, OH) led the State in construction sand and gravel production, with about 2.7 Mt from 13 operations. This was followed by, in descending order of production: Martin Marietta Aggregates (Raleigh, NC), which produced 2.4 Mt from nine operations; Olen Corp. (Columbus, OH), which produced 1.7 Mt from four operations; Watson Gravel Inc. (Middletown, OH), which produced 1.4 Mt from seven operations; and, Barrett Paving Materials Inc. (Roseland, NJ), which produced 915,000 t from nine operations. ODGS reported that 25.5 Mt was produced in total for 2009 (Ohio Division of Geological Survey, 2010a, p. 95–96).

Sand and Gravel, Industrial.—The State has an abundance of high silica sandstone that can be used for glass manufacture and other industrial applications. Best Sand Corp. produced about 507,000 t of industrial sand from the Pennsylvanian-age Sharon conglomerate in Geauga and Jackson Counties. Ogleby Norton Industrial Sands, Inc. produced about 128,000 t of high silica sand from operations in Knox and Perry Counties. Production came from the Mississippian-age Black Hand Sandstone and the Pennsylvanian-age Massillon Sandstone, respectively (Ohio Division of Geological Survey, 2010a, p. 115–117).

Stone, Crushed.—In 2009, 104 active quarries, operated by 53 companies, produced or sold limestone and dolomite in the State, with a total production of 38 Mt (Ohio Division of Geological Survey, 2010a, p. 85).

Government Programs

The 2009 Report on Ohio Mineral Industries, prepared by the ODGS, contains detailed production, employment, and geologic information on each industrial mineral operation in the State (Ohio Division of Geological Survey, 2010a). Included with the report is a legislatively mandated map showing active mineral industry operations in the State. A Web-based Geographic Information System (GIS) version of the Ohio mineral industries map from the report allows a user to directly access updated data and a summary of industrial information listed by permitted operation (Ohio Division of Geological Survey, 2010b).

References Cited

American Iron and Steel Institute, 2010, Table 24—Raw steel production by States, in American Iron and Steel Institute—AISI 2010 ASR: Washington, DC, American Iron and Steel Institute, 140 p.

Ohio Division of Geological Survey, 2010a, 2009 report on Ohio mineral industries—An annual summary of the State's economic geology: Columbus, OH, Ohio Division of Geological Survey annual report, 125 p. (Accessed January 15, 2013, at http://www.dnr.state.oh.us/Portals/10/pdf/min_ind_report/MinInd09.pdf.)

Ohio Division of Geological Survey, 2010b, 2009 map of active mineral industry operations in Ohio: Columbus, OH, Ohio Division of Geological Survey map, November, 1 p. (Accessed January 15, 2013, at http://www.dnr.state.oh.us/website/geosurvey/INDUSTRIAL/viewer.htm and via http://www.dnr.state.oh.us/tabid/8409/Default.aspx.)

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN OHIO[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	916	92,000 e	762	74,000 e	550	53,000 e
Clays, common	1,190	16,500	983	15,900	770	13,400
Gemstones, natural	NA	4	NA	4	NA	4
Lime	1,690	159,000	1,670	166,000	1,130	129,000
Sand and gravel:						
Construction	41,000 r	272,000 r	33,800 r	244,000 r	27,200	241,000
Industrial	1,080	33,000	1,010	34,300	849	26,300
Stone:						
Crushed	68,000	448,000	54,100 r	446,000 r	42,700	388,000
Dimension	37	6,050	29 r	3,660 r	26	4,790
Combined values of cement (masonry), clays (fire), peat, salt	XX	254,000	XX	262,000 r	XX	277,000
Total	XX	1,280,000	XX	1,250,000 r	XX	1,130,000

eEstimated. rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
OHIO: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	94 r	50,900 r	$420,000 r	89	40,400	$368,000
Dolomite	6	2,720	22,400	5	1,530	11,300
Sandstone and quartzite	6	444	3,820	5	426	3,870
Miscellaneous stone	--	--	--	2	326	4,060
Total	XX	54,100 r	446,000 r	XX	42,700	388,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
OHIO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	36	401
Filter stone	W	W
Other coarse aggregate	425	3,790
Coarse aggregate, graded:		
Concrete aggregate, coarse	174	1,240
Bituminous aggregate, coarse	245	2,610
Bituminous surface-treatment aggregate	7	59
Railroad ballast	W	W
Other graded coarse aggregate	5,910	51,400
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	107	1,540
Screening, undesignated	57	353
Other fine aggregate	885	7,800
Coarse and fine aggregates:		
Graded road base or subbase	1,480	10,300
Unpaved road surfacing	W	W
Crusher run or fill or waste	159	1,250
Other coarse and fine aggregates	1,810	13,800
Other construction materials	33	252
Agricultural, limestone	W	W
Other miscellaneous uses and specified uses not listed	3	70
Unspecified:[2]		
Reported	19,100	197,000
Estimated	11,800	92,800
Total	42,700	388,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

OHIO: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	32	331
Coarse aggregate, graded[3]	W	W	2,540	19,000	W	W
Fine aggregate (-⅜ inch)[4]	246	2,530	476	4,690	W	W
Coarse and fine aggregate[5]	1,350	9,260	W	W	694	5,440
Other construction materials	33	252	--	--	--	--
Agricultural[6]	W	W	W	W	W	W
Other miscellaneous uses	--	--	--	--	--	--
Unspecified:						
Reported	7,880	85,300	2,430	24,800	2,560	23,400
Estimated	4,150	30,200	1,170	10,200	3,060	23,300
Total	16,200	152,000	7,570	66,900	6,660	54,700

Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	--	--	--	--	W	W
Coarse aggregate, graded[3]	--	--	742	6,920	W	W
Fine aggregate (-⅜ inch)[4]	--	--	--	--	W	W
Coarse and fine aggregate[5]	--	--	--	--	W	W
Other construction materials	--	--	--	--	--	--
Agricultural[6]	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	3	70
Unspecified:[7]						
Reported	4,940	51,900	286	2,330	1,030	8,810
Estimated	540	4,310	1,060	8,580	1,850	16,200
Total	5,480	56,200	2,090	17,800	4,660	39,500

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes macadam, filter stone, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Reported and estimated production without a breakdown by end use.

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TABLE 5
OHIO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	5,870	$44,100	$7.50
Plaster and gunite sands	399	1,610	4.04
Concrete products (blocks, bricks, pipe, decorative, etc.)	79	788	9.97
Asphaltic concrete aggregates and other bituminous mixtures	2,290	15,900	6.94
Road base and coverings[2]	1,220	8,800	7.24
Fill	1,960	12,000	6.15
Snow and ice control	108	566	5.24
Other miscellaneous uses[3]	263	2,010	7.65
Unspecified:[4]			
Reported	14,000	148,000	10.60
Estimated	1,020	7,110	7.00
Total or average	27,200	241,000	8.87

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (cement).
[3]Includes filtration and railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

TABLE 6
OHIO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	279	1,980	648	4,310	2,100	16,300
Asphaltic concrete aggregates and road base materials[3]	319	2,320	730	5,740	958	6,910
Fill	156	772	608	4,150	566	2,830
Snow and ice control	--	--	27	206	W	W
Other miscellaneous uses[4]	26	196	109	929	33	174
Unspecified:[5]						
Reported	92	667	5,200	37,400	4,980	39,100
Estimated	--	--	627	4,390	37	258
Total	871	5,940	7,940	57,100	8,670	65,600
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	565	5,020	1,150	7,640	1,620	11,200
Asphaltic concrete aggregates and road base materials[3]	346	2,620	854	5,380	296	1,700
Fill	322	2,140	276	2,010	31	133
Snow and ice control	W	W	41	195	6	30
Other miscellaneous uses[4]	71	569	40	161	17	118
Unspecified:[5]						
Reported	124	887	2,120	58,400	1,450	11,500
Estimated	--	--	49	343	303	2,120
Total	1,430	11,200	4,530	74,100	3,720	26,800

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement).
[4]Includes filtration and railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

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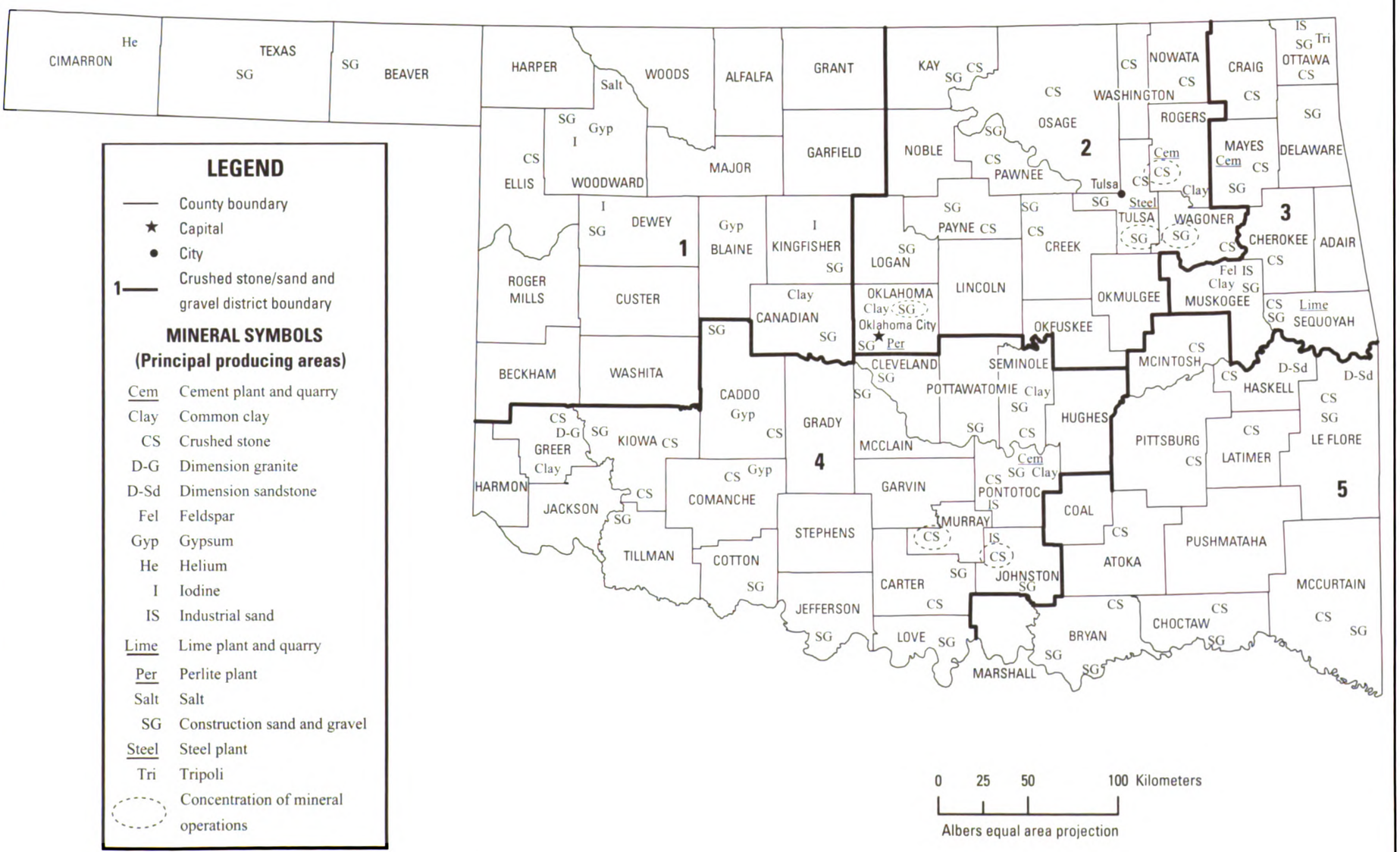
OKLAHOMA



LEGEND

- County boundary
- ★ Capital
- • City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant and quarry
Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
D-Sd	Dimension sandstone
Fel	Feldspar
Gyp	Gypsum
He	Helium
I	Iodine
IS	Industrial sand
Lime	Lime plant and quarry
Per	Perlite plant
Salt	Salt
SG	Construction sand and gravel
Steel	Steel plant
Tri	Tripoli
⬭	Concentration of mineral operations

Source: Oklahoma Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF OKLAHOMA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Oklahoma Geological Survey for collecting information on all nonfuel minerals.

In 2009, Oklahoma's nonfuel raw mineral production[1] was valued at $667 million, based upon annual U.S. Geological Survey (USGS) data. This was a $153 million, or 18%, decrease from the State's total nonfuel mineral value of $820 million in 2008, which then had increased by $86 million, or almost 12%, from the total of $734 million in 2007. The State decreased to 28th from 27th in rank among the 50 States in total nonfuel mineral production value, accounting for 1.1% of the U.S. total value.

In 2009, crushed stone continued to be Oklahoma's leading nonfuel mineral commodity, based upon value, accounting for 46% of the State's total nonfuel mineral production value, an increase from 42% in 2008. Crushed stone was followed by portland cement, construction sand and gravel, crude iodine, industrial sand and gravel, and Grade-A helium (descending order of value). Four of the State's leading industrial minerals—crushed stone, construction sand and gravel, industrial sand and gravel, and crude gypsum—accounted for 65% of the State's total production value, essentially unchanged from 63% and 62% in 2008 and 2007, respectively.

Almost all mineral commodities produced in the State decreased in production value in 2009. The two exceptions were gemstones, the production value of which remained unchanged from that of 2008, and Grade-A helium, which saw an 8% increase in production value with a 25% increase in production. All other mineral commodities produced in the State declined in both the quantity produced and production value. The largest single decrease for production and production value was for portland cement, down almost 29% in production and production value from 2008 (actual values withheld—company proprietary data). This was followed by crushed stone, down by almost $38 million, construction sand and gravel, down by $27 million, industrial sand and gravel, down by $23 million, and dimension stone, down by $4 million. Combined, these four mineral commodities were down $92 million from almost $513 million in 2008 to $420 million in 2009, which was 6% lower than their combined production value figure of almost $449 million in 2007. The largest single decrease in production was for crushed stone, down 10.4 million metric tons (Mt) from 47.2 Mt in 2008 to 36.8 Mt in 2009. Other significant decreases in production and production value were for salt, iodine, and lime.

No metals were mined in the State in 2009. In 2009, Oklahoma continued to be the only State that produced iodine and remained 4th in industrial sand and gravel production, 7th in common clay production, and 11th in masonry cement production. Oklahoma increased to first from fourth in the production of crude gypsum. The State decreased to second from first among the four tripoli-producing States and to fifth from fourth in the production of feldspar among the seven feldspar-producing States. Expanded perlite was produced at a facility near Oklahoma City and steel and steel products were produced in the Tulsa vicinity.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN OKLAHOMA[1,2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Clays, common		1,050	5,170	756	3,900	572	2,800
Gemstones, natural		NA	106	NA	4	NA	4
Gypsum, crude		2,820 r	17,100 r	2,180 r	16,200 r	2,180	15,900
Sand and gravel:							
Construction		16,200	94,200 r	14,700 r	95,500 r	11,600	68,200
Industrial		1,710	44,600	2,040	63,700	1,410	40,300
Stone:							
Crushed		45,800	298,000	47,200 r	345,000 r	36,800	308,000
Dimension		65	11,700	53	8,750	35	4,330
Tripoli	metric tons	40,600	1,600	86,000	1,800	W	W
Combined values of cement, feldspar, helium (Grade–A), iodine (crude), lime, salt, and value indicated by symbol W		XX	261,000	XX	285,000	XX	228,000
Total		XX	734,000 r	XX	820,000 r	XX	667,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data.
XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
OKLAHOMA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	50 r	40,800 r	$298,000 r	51	31,300	$262,000
Granite	3	1,870	15,300	4	2,810	24,400
Sandstone and quartzite	9 r	1,220 r	9,070 r	11	861	7,350
Miscellaneous stone	13	3,310	23,100	11	1,840	14,200
Total	XX	47,200 r	345,000 r	XX	36,800	308,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
OKLAHOMA: CRUSHED STONE SOLD OR USED BY
PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	191	2,330
Filter stone	131	925
Other coarse aggregate	110	850
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,950	37,600
Bituminous aggregate, coarse	182	1,610
Bituminous surface-treatment aggregate	327	3,770
Railroad ballast	W	W
Other graded coarse aggregate	3,280	26,000
Fine aggregate (-⅜ inch):		
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	105	760
Other fine aggregate	119	897
Coarse and fine aggregates:		
Graded road base or subbase	762	6,690
Unpaved road surfacing	179	1,130
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	835	7,400
Other coarse and fine aggregates	485	2,640
Agricultural, limestone	W	W
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]		
Reported	18,500	150,000
Estimated	6,900	55,200
Total	36,800	308,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
OKLAHOMA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	--	--	W	W	W	W
Coarse aggregate, graded[3]	--	--	W	W	--	--
Fine aggregate (-⅜ inch)[4]	--	--	W	W	W	W
Coarse and fine aggregate[5]	--	--	W	W	W	W
Agricultural[6]	--	--	W	W	W	W
Chemical and metallurgical[7]	--	--	W	W	--	--
Unspecified:[8]						
Reported	11	55	2,850	21,400	653	5,110
Estimated	--	--	1,060	8,520	2,170	16,200
Total	11	55	8,040	77,100	3,170	23,600

	District 4		District 5	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[2]	W	W	123	1,020
Coarse aggregate, graded[3]	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W
Coarse and fine aggregate[5]	W	W	W	W
Agricultural[6]	--	--	W	W
Chemical and metallurgical[7]	W	W	--	--
Unspecified:[8]				
Reported	11,200	91,400	3,740	31,600
Estimated	1,400	12,200	2,270	18,300
Total	18,800	150,000	6,870	56,600

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement manufacture.

[8]Reported and estimated production without a breakdown by end use.

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TABLE 5
OKLAHOMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates and concrete products	1,760	$10,600	$6.05
Plaster and gunite sands	267	1,790	6.72
Asphaltic concrete aggregates and other bituminous mixtures	268	1,440	5.36
Road base and coverings	379	2,100	5.55
Fill	1,030	4,050	3.94
Other miscellaneous uses[2]	7	41	5.86
Unspecified:[3]			
Reported	3,160	23,200	7.33
Estimated	4,700	25,000	5.32
Total or average	11,600	68,200	5.90

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes snow and ice control.
[3]Reported and estimated production without a breakdown by end use.

TABLE 6
OKLAHOMA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	W	W	1,120	5,340	W	W
Asphaltic concrete aggregates and road base materials	W	W	102	612	W	W
Fill	38	156	474	1,400	W	W
Other miscellaneous uses[3]	--	--	6	36	--	--
Unspecified:[4]						
Reported	913	7,860	1,210	8,910	W	W
Estimated	392	2,070	1,960	10,100	416	2,600
Total	1,990	14,700	4,880	26,400	1,040	6,100

	District 4		District 5	
Use	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	376	2,980	W	W
Asphaltic concrete aggregates and road base materials	158	603	W	W
Fill	819	2,780	W	W
Other miscellaneous uses[3]	1	5	--	--
Unspecified:[4]				
Reported	602	4,320	W	W
Estimated	314	2,010	2,830	18,400
Total	2,270	12,700	1,400	8,290

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes snow and ice control.
[4]Reported and estimated production without a breakdown by end use.

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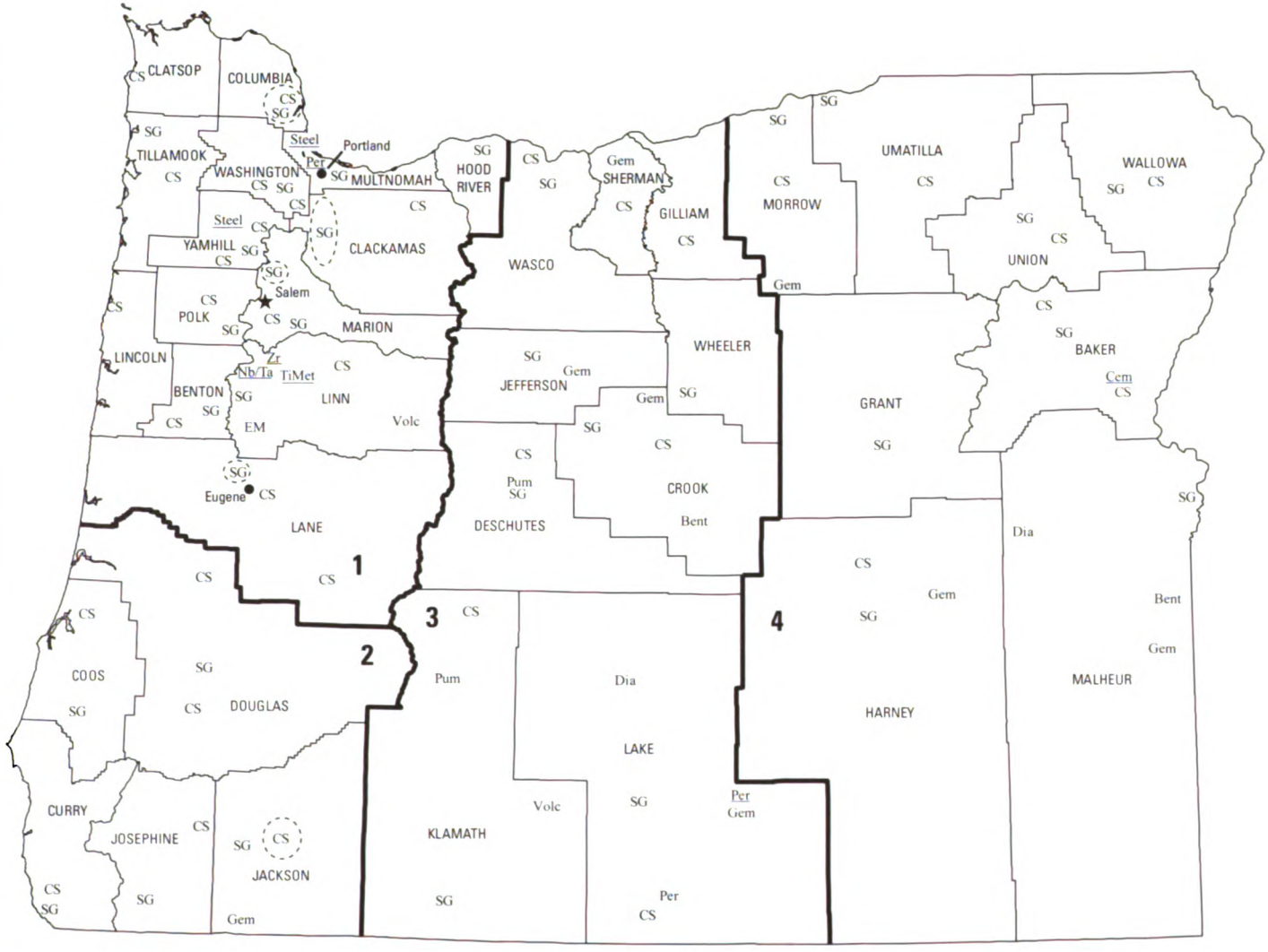
OREGON



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Bent	Bentonite
Cem	Cement plant
CS	Crushed stone
Dia	Diatomite
EM	Emery
Gem	Gemstones
Nb/Ta	Niobium (columbium) and tantalum plant
Per	Perlite
Per	Perlite plant
Pum	Pumice and pumicite
SG	Construction sand and gravel
Steel	Steel plant
TiMet	Titanium metal plant
Volc	Volcanic cinder
Zr	Zirconium plant
⬭	Concentration of mineral operations

Source: Oregon Department of Geology and Mineral Industries/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF OREGON

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Oregon Department of Geology and Mineral Industries for collecting information on all nonfuel minerals.

In 2009, Oregon's nonfuel raw mineral production[1] was valued at $314 million, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of $88 million, or almost 22%, from the State's total nonfuel mineral value of $402 million in 2008, which followed a $104 million, or an almost 21%, decrease from a total of $506 million in 2007. The State declined in rank to 36th from 35th among the 50 States in total nonfuel mineral production value.

Oregon's top five mineral commodities, in descending order of production value, remained unchanged from those of 2007–08: crushed stone, construction sand and gravel, portland cement, diatomite, and crude perlite. The top five mineral commodities continued to account for almost 98% of the State's total nonfuel raw mineral production value in 2009. Oregon also continued to produce emery, lime, and pumice and pumicite. Crushed stone and construction sand and gravel accounted for 70% of Oregon's total nonfuel mineral production value, down slightly from 73% in 2007–08.

In 2009, only emery and lime production increased or remained flat, with production values increasing significantly for both commodities. All other mineral commodities experienced decreases in production and production value, with the decline in construction aggregates having the largest impact on the overall production value of the State. Crushed stone had the largest decrease in production value in 2009, down by $55 million, or almost 32%, to $119 million in 2009, from $174 million in 2008, which followed a $37 million, or almost 18%, decrease from $211 million in 2007. The total production of crushed stone in 2009, 15.8 million metric tons (Mt), was almost one-half of that in 2007, 30.6 Mt, and one-third less than the 2008 total, 23.5 Mt. Construction sand and gravel had the next largest decrease in production value, $19 million, from $121 million in 2008 to $102 million in 2009, with production decreasing by 2.7 Mt, or 18%, from 14.9 Mt in 2008 to 12.2 Mt in 2009. Portland cement, diatomite, and crude perlite followed. These three mineral commodities (actual values withheld—company proprietary data) were down almost $13.8 million, combined, with their production down by an average of 16% from that of 2008.

In 2009, Oregon was the only State with reported emery production (actual production data withheld—company proprietary data). The State continued to rank second in the quantity of crude perlite produced among the six perlite-producing States, third in the production of diatomite out of four producing States. The State rose from fifth to second in the production of pumice and pumicite. Oregon ranked second for the production of natural gemstones (based upon production value). The State remained a moderate producer of natural aggregates, including crushed stone and construction sand and gravel, ranking among the top one-half of producing States.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN OREGON[1, 2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	2,150	NA	1,620	NA	1,220
Sand and gravel, construction	21,200	164,000 r	14,900 r	121,000 r	12,200	102,000
Stone, crushed	30,600	211,000	23,500 r	174,000 r	15,800	119,000
Combine values of cement (portland), clays [bentonite, common (2007–08)], diatomite, emery (2008–09), lime, perlite (crude), pumice and pumicite	XX	128,000	XX	106,000	XX	91,500
Total	XX	506,000 r	XX	402,000 r	XX	314,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
OREGON: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Granite	11	567	$4,340	11	564	$4,500
Traprock	123 r	12,300 r	89,300 r	98	6,930	55,500
Volcanic cinder and scoria	4	177	1,220	2	4	30
Miscellaneous stone	84 r	10,500 r	79,300 r	74	8,310	58,900
Total	XX	23,500 r	174,000 r	XX	15,800	119,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
OREGON: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	13	189
Filter stone	W	W
Other coarse aggregate	172	1,480
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	252	2,270
Bituminous surface-treatment aggregate	W	W
Railroad ballast	103	948
Other graded coarse aggregate	27	449
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	91	751
Screening, undesignated	W	W
Other fine aggregate	83	1,130
Coarse and fine aggregates:		
Graded road base or subbase	1,150	7,700
Unpaved road surfacing	83	559
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	189	1,200
Other coarse and fine aggregates	438	3,650
Unspecified:[2]		
Reported	5,950	43,800
Estimated	7,170	54,100
Total	15,800	119,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
OREGON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	58	605	W	W	W	W
Coarse aggregate, graded[3]	208	2,280	--	--	W	W
Fine aggregate (-⅜ inch)[4]	153	1,680	--	--	W	W
Coarse and fine aggregates[5]	1,070	8,360	W	W	W	W
Unspecified:[6]						
Reported	1,860	14,800	697	6,020	524	4,700
Estimated	4,720	33,800	1,320	10,600	658	5,770
Total	8,070	61,500	2,200	18,100	1,610	13,600

Use	District 4		Unspecified districts	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[2]	W	W	32	134
Coarse aggregate, graded[3]	W	W	--	--
Fine aggregate (-⅜ inch)[4]	W	W	--	--
Coarse and fine aggregates[5]	W	W	163	765
Unspecified:[6]				
Reported	700	2,570	2,170	15,800
Estimated	273	2,080	208	1,870
Total	1,360	7,180	2,570	18,500

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregates.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregates.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

[6]Reported and estimated production without a breakdown by end use.

TABLE 5
OREGON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products	991	$10,700	$10.82
Plaster and gunite sands	20	120	6.00
Asphaltic concrete aggregates and other bituminous mixtures	443	2,880	6.49
Road base and coverings[2]	1,930	14,200	7.36
Fill	329	1,840	5.59
Snow and ice control	4	32	8.00
Other miscellaneous uses[3]	8	126	15.75
Unspecified:[4]			
Reported	4,010	36,400	9.07
Estimated	4,450	36,000	8.08
Total or average	12,200	102,000	8.39

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes road and other stabilization (cement).

[3]Includes railroad ballast.

[4]Reported and estimated production without a breakdown by end use.

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TABLE 6
OREGON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		Districts 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	742	7,020	74	649	88	1,150
Asphaltic concrete aggregates and road base materials[3]	1,580	11,300	317	2,480	193	1,430
Fill	136	722	6	49	171	1,020
Other miscellaneous uses[4]	(5)	9	1	7	6	101
Unspecified:[6]						
Reported	3,230	28,500	590	6,420	128	1,160
Estimated	3,150	24,800	402	4,290	483	3,580
Total	8,840	72,400	1,390	13,900	1,070	8,430

	District 4		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	107	2,020	--	--
Asphaltic concrete aggregates and road base materials[3]	287	1,810	--	--
Fill	16	52	--	--
Other miscellaneous uses[4]	5	42	--	--
Unspecified:[6]				
Reported	28	229	36	75
Estimated	421	3,320	--	--
Total	864	7,470	36	75

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes railroad ballast and snow and ice control.

[5]Less than ½ unit.

[6]Reported and estimated production without a breakdown by end use.

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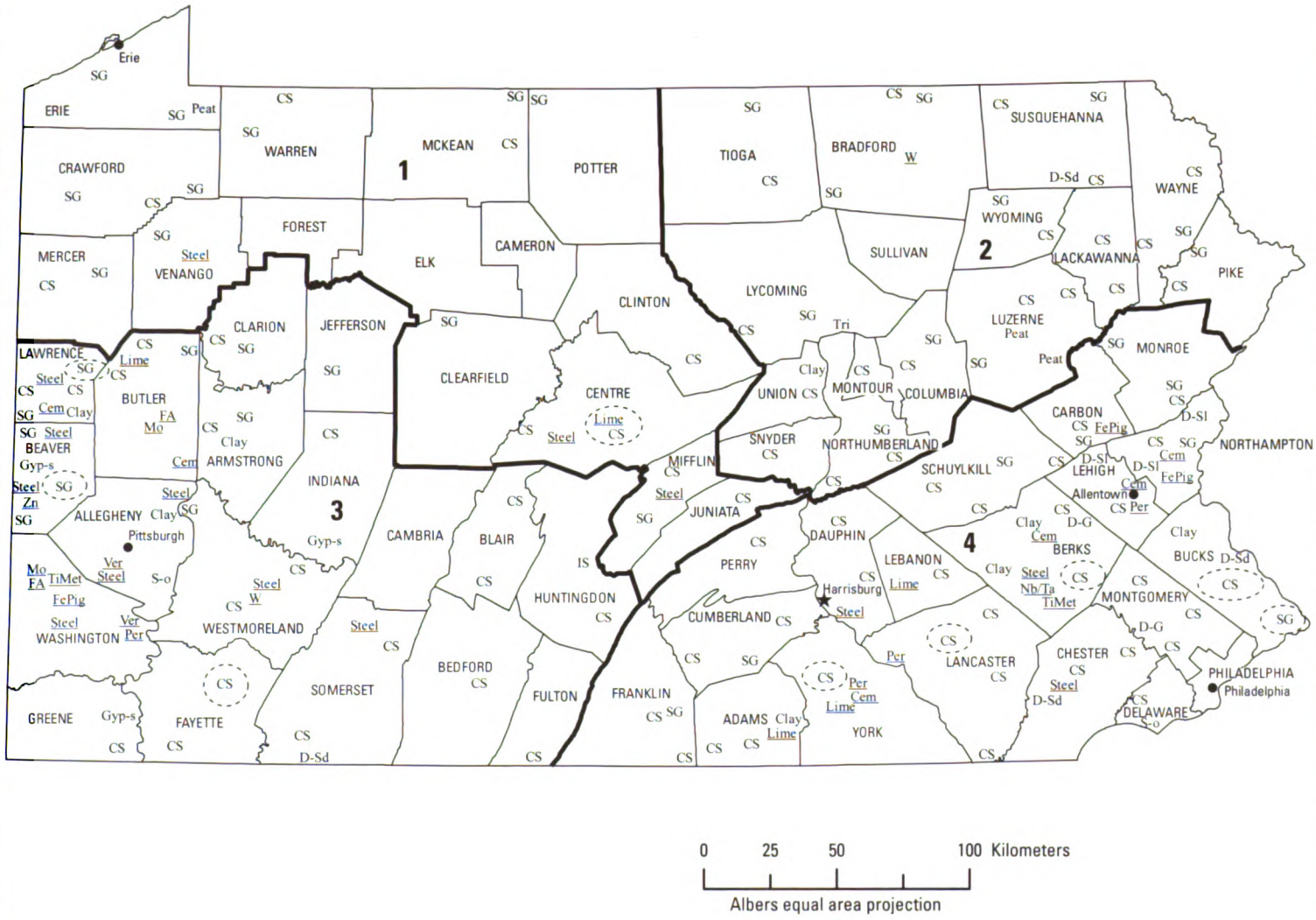
PENNSYLVANIA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
D-Sd	Dimension sandstone
D-Sl	Dimension slate
FePig	Iron oxide pigments plant
FA	Ferroalloys plant
Gyp-s	Synthetic gypsum
IS	Industrial sand
Lime	Lime plant
Mo	Molybdenum plant
Nb/Ta	Niobium and tantalum plant
Peat	Peat
Per	Perlite plant
S-o	Sulfur (oil)
SG	Construction sand and gravel
Steel	Steel plant
TiMet	Titanium metal plant
Tri	Tripoli
W	Tungsten plant
Ver	Vermiculite plant
Zn	Zinc plant

Concentration of mineral operations

Source: Pennsylvania Bureau of Topographic and Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF PENNSYLVANIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Pennsylvania Bureau of Topographic and Geologic Survey for collecting information on all nonfuel minerals.

In 2009, Pennsylvania's nonfuel raw mineral production[1] was valued at $1.62 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $350 million, or an almost 18%, decrease from the total production value of $1.97 billion in 2008, which had increased by $110 million, or 5.9%, from the total production value of $1.86 billion in 2007. Pennsylvania rose in rank to12th from 13th in the Nation in total nonfuel mineral production value and accounted for almost 2.8% of the U.S. total production value. This is the State's highest rank since 2002, when it ranked 9th and accounted for 3.4% of the U.S. total production value. (The actual totals for 2007–09 may be higher than those shown in table 1; tripoli data have been withheld to avoid disclosing company proprietary data.)

The State's leading nonfuel mineral commodities produced in 2009, by order of descending value, were crushed stone, portland cement, lime, construction sand and gravel, and masonry cement. These five commodities made up 98% of Pennsylvania's total nonfuel mineral production value. Pennsylvania continues to be among the Nation's leading producers of crushed stone and portland and masonry cement. These three mineral commodities account for 83% of the State's total nonfuel mineral industry value.

The two largest decreases in mineral production value in Pennsylvania in 2009 took place with crushed stone and portland cement, accounting for 91% of the total $350 million decrease. Crushed stone decreased from 101 million metric tons (Mt) produced in 2008, valued at $1.14 billion, to 83 Mt in 2009, valued at $975 million. Portland cement decreased from 5.15 Mt in 2008, valued at $510 million, to 3.74 Mt, valued at $356 million.

Construction sand and gravel and masonry cement also decreased in production and production value, down 2.2 Mt and 0.78 Mt, and $18 million and $10.3 million, respectively. These four mineral commodities account for 99% of the State's total decrease in total production value. Other significant decreases took place with dimension stone and industrial sand and gravel.

Pennsylvania continued to rank second in the Nation in the quantity of crushed stone produced and fourth of four tripoli-producing States. The State also remained seventh in the production of lime. The State rose in rank from 7th to 5th in the production of masonry cement, from 10th to 8th in peat sales, from 11th to 10th in common clay production, and from 12th to 10th in dimension stone production. Pennsylvania dropped from 3d to 4th in portland cement production and from 19th to 20th in construction sand and gravel production.

Producing exclusively industrial minerals and coal, Pennsylvania did not produce any primary metals from ores mined in the State; the last metal-mining operation in the State closed more than 30 years ago. Metals that were produced in the State in 2009, principally steel, as well as ferroalloys, molybdenum, niobium, tantalum, titanium, tungsten, and zinc, were processed from materials acquired from other domestic and foreign sources. Additionally, Pennsylvania produced significant quantities of cadmium metal and finished iron oxide pigments. The State continued to rank first of three producing States for cadmium metal and fourth of eight producing States for finished iron oxide pigments. Metals operations were concentrated primarily in the industrial southwestern and eastern portions of the State, in the vicinities of Pittsburgh and Allentown, respectively.

The Pennsylvania Bureau of Topographic and Geologic Survey,[2] also known as the Pennsylvania Geological Survey (PGS), within the Pennsylvania Department of Conservation and Natural Resources, provided the following narrative information.

Government Programs and Activities

The PGS continued to conduct geologic investigations, surveys, and research of the geology, mineral resources, and topography of the State. The PGS continued to be an active participant in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP) through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers.

Sixteen new publications were produced in 2009, including 13 bedrock geologic maps and 3 surficial geologic maps that were funded under the STATEMAP program.

Digital maps of bedrock geology were produced under the STATEMAP program covering the following areas of Pennsylvania: the McVeytown 7.5-minute quadrangle, Juniata and Mifflin Counties; the State College 7.5-minute quadrangle, Centre County; the Mansfield 7.5-minute quadrangle, Tioga County; the Kirkwood 7.5-minute

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Leonard J. Lentz, P.G., Geologic Scientist with the Pennsylvania Geological Survey, authored the text of the State mineral industry information provided by that State agency.

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quadrangle and the Pennsylvania portion of the Rising Sun 7.5-minute quadrangle, southeast Lancaster and southwest Chester Counties, respectively; the northern portions of the Wakefield and Holtwood 7.5-minute quadrangles, Lancaster and York Counties, respectively; the Pennsylvania portion of the Delta and Conowingo Dam 7.5-minute quadrangles, York and Lancaster Counties; respectively; and, portions of the Phoenixville, Pottstown, Elverson, and Morgantown 7.5-minute quadrangles, mostly in Chester County, along with parts of Montgomery, Berks, and Lancaster Counties.

Digital maps of surficial geology were produced under the STATEMAP program covering the following areas: the Jackson Summit and Mansfield 7.5-minute quadrangles, Tioga County; and, the Sugar Lake 7.5-minute quadrangle, Crawford and Venango Counties.

The PGS continued its program of making older publications available on the Internet in a digital format that can be read or downloaded at no charge. Such publications made available in 2009 included: two water resource reports by Hollowell and Koester (1975) and Carswell and Lloyd (1979); a map compiled by Berg, Edmunds, Geyer, and others (1980); and, a general geologic report by Leverett (1934).

More information regarding the geology, hydrology, mineral resources, and mining history of Pennsylvania, as well as a variety of PGS publications, is available from the PGS. Much of this information, PGS contact information, and several educational series publications regarding both nonfuel and fuel minerals are available on the Internet at http://www.dcnr.state.pa.us/topogeo/index.aspx. Complete information on obtaining all Pennsylvania Geological Survey publications is with the PGS online listing of publications http://www.dcnr.state.pa.us/topogeo/pub/lop.pdf.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN PENNSYLVANIA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Cement:						
Masonry	304	40,500 e	254	34,000 e	176	23,700 e
Portland	5,660	568,000 e	5,150	510,000 e	3,740	356,000 e
Clays, common	683	4,890	640	4,840	451	3,040
Gemstones, natural	NA	1	NA	1	NA	1
Lime	1,100	112,000	1,130	126,000	985	126,000
Peat	2	79	2	62	3	90
Sand and gravel:						
Construction	18,300	143,000	16,100 r	132,000 r	13,900	114,000
Industrial	685	15,800	677	16,300	618	15,600
Stone:						
Crushed	111,000	960,000	101,000 r	1,140,000	83,000	975,000
Dimension	59	16,200	42	11,100	39	9,670
Tripoli	W	W	W	W	W	W
Total	XX	1,860,000	XX	1,970,000	XX	1,620,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
PENNSYLVANIA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	121 r	57,700 r	$574,000 r	111	46,200	$479,000
Dolomite	21	12,000	113,000	20	10,200	98,800
Granite	8	4,160	40,100	6	2,780	28,700
Traprock	9	6,350	215,000	9	5,190	185,000
Sandstone and quartzite	62	11,600	109,000	64	11,300	113,000
Slate	27 r	1,530 r	16,300 r	18	888	10,000
Miscellaneous stone	30 r	7,720	69,300	32	6,460	59,900
Total	XX	101,000 r	1,140,000	XX	83,000	975,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
PENNSYLVANIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	804	9,070
Filter stone	313	2,850
Other coarse aggregate	792	7,130
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,270	22,800
Bituminous aggregate, coarse	2,610	26,600
Bituminous surface-treatment aggregate	987	11,400
Railroad ballast	812	7,170
Other graded coarse aggregate	4,100	34,300
Fine aggregate (-⅜ inch):		
Stone sand, concrete	79	665
Stone sand, bituminous mix or seal	1,610	15,900
Screening, undesignated	599	5,530
Other fine aggregate	2,530	24,900
Coarse and fine aggregates:		
Graded road base or subbase	3,650	30,200
Unpaved road surfacing	868	8,920
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	765	6,610
Roofing granules	W	W
Other coarse and fine aggregates	5,500	40,900
Other construction materials	1,020	9,100
Agricultural:		
Limestone	664	8,460
Poultry grit and mineral food	W	W
Other agricultural uses	11	848
Chemical and metallurgical:		
Cement manufacture	1,870	24,900
Lime manufacture	W	W
Flux stone	363	2,290
Chemical stone	W	W
Sulfur oxide removal	349	4,930
Special:		
Mine dusting or acid water treatment	W	W
Asphalt fillers or extenders	152	3,180
Whiting or whiting substitute	W	W
Other fillers or extenders	66	1,460
Other miscellaneous uses and specified uses not listed	52	516
Unspecified:[2]		
Reported	14,200	146,000
Estimated	33,700	348,000
Total	83,000	975,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

PENNSYLVANIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregates[5]	W	W	W	W	W	W
Other construction materials	31	307	--	--	787	6,860
Agricultural[6]	W	W	W	W	W	W
Chemical and metallurgical[7]	--	--	W	W	W	W
Special[8]	--	--	W	W	W	W
Other miscellaneous uses and specified uses not listed	--	--	24	216	--	--
Unspecified:[9]						
Reported	957	9,440	1,960	20,300	4,510	44,500
Estimated	5,490	53,700	5,350	58,800	9,450	97,100
Total	7,140	68,300	11,000	112,000	21,200	221,000

	District 4	
	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch)[2]	W	W
Coarse aggregate, graded[3]	7,450	68,100
Fine aggregate (-⅜ inch)[4]	3,100	30,100
Coarse and fine aggregates[5]	8,220	203,000
Other construction materials	203	1,930
Agricultural[6]	W	W
Chemical and metallurgical[7]	2,620	34,400
Special[8]	W	W
Other miscellaneous uses and specified uses not listed	28	301
Unspecified:[9]		
Reported	6,770	72,000
Estimated	13,400	138,000
Total	43,700	574,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregates.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregates.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, terrazzo and exposed aggregate, unpaved road surfacing,and other coarse and fine aggregates.

[6]Includes limestone, poultry grit and mineral food, and other agricultural uses.

[7]Includes cement and lime manufacture, chemical stone, flux stone, and sulfur oxide removal.

[8]Includes asphalt fillers or extenders, mine dusting or acid water treatment, whiting or whiting substitue, other fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

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TABLE 5
PENNSYLVANIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	1,170	$12,200	$10.42
Concrete products (blocks, bricks, pipe, decorative, etc.)[2]	53	448	8.45
Asphaltic concrete aggregates and other bituminous mixtures	488	4,640	9.50
Road base and coverings	868	5,900	6.80
Fill	1,340	6,080	4.53
Snow and ice control	173	1,200	6.96
Other miscellaneous uses[3]	323	3,610	11.18
Unspecified:[4]			
Reported	1,470	13,000	8.84
Estimated	8,020	67,500	8.41
Total or average	13,900	114,000	8.24

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

TABLE 6
PENNSYLVANIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	571	4,990	307	3250	--	--
Asphaltic concrete aggregates and road base materials	702	5,350	402	3,140	W	W
Fill	46	255	139	343	W	W
Other miscellaneous uses[3]	180	1,250	4	64	15	162
Unspecified:[4]						
Reported	89	746	345	3,050	873	7,710
Estimated	1,790	15,900	1,730	13,700	4,250	35,700
Total	3,370	28,500	2,930	23,500	5,140	43,600

Use	District 4		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	342	4,380	1	5
Asphaltic concrete aggregates and road base materials	237	1,880	W	W
Fill	1,140	5,360	W	W
Other miscellaneous uses[3]	300	3,460	7	11
Unspecified:[4]				
Reported	159	1,460	--	--
Estimated	248	2,120	--	--
Total	2,430	18,700	23	156

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes railroad ballast and snow and ice control.
[4]Reported and estimated production without a breakdown by end use.

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PUERTO RICO

LEGEND

- ★ Capital
- ● City
- —— Municipality boundary

MINERAL SYMBOLS
(Principal producing areas)

Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Lime	Lime plant
Salt	Salt
SG	Construction sand and gravel

Source: Department of Natural Resources, Commonwealth of Puerto Rico/U.S. Geological Survey (2009).

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The Mineral Industry of Puerto Rico and the Administered Islands[1]

In 2009, Puerto Rico's nonfuel raw mineral production[1] was valued at $72.3 million, based upon annual U.S. Geological Survey (USGS) data. This was nearly a $26.5 million, or 27%, decrease from the $99 million of 2008, which had decreased by $6 million, or by 5.4% from 2007 to 2008. If ranked in comparison with the 50 States, Puerto Rico would rank 48th in total nonfuel mineral production value (down from 42d in 2008).

Portland cement, by value remained Puerto Rico's leading nonfuel mineral commodity, followed by crushed stone, lime, salt, and common clay. The value of portland cement decreased by more than 21% in 2009, coinciding with a significant decline in production. The Commonwealth's decrease in total mineral production value does not reflect the value of portland cement in order to avoid disclosing company proprietary data. In 2009, crushed stone decreased in value by $27.2 million, or 28%, followed by common clays, down by $109,000, or 25%, from the 2008 production value. The most significant increase in production value was lime, up by $749,000, or 75%. Additionally, crushed stone value makes up 95% of Puerto Rico's publishable nonfuel mineral value and together with the next leading commodity's value, lime, makes up 97% of the Commonwealth's publishable nonfuel mineral value. The value of salt remained the same as that of 2008.

Construction sand and gravel was produced in Puerto Rico, mainly for use as aggregate in concrete and concrete products, as road base materials, and as fill. The collection and compilation of production data for construction sand and gravel in Puerto Rico were discontinued by the U.S. Bureau of Mines (the Federal Government agency then responsible for collecting domestic raw nonfuel mineral production data) because of a substantially low rate of response to surveys by the industry (Sikich and Alonso, 1994). In 1995, the function of collecting mineral production data was transferred to the USGS. The USGS does not survey sand and gravel producers in Puerto Rico; construction sand and gravel operations on the map are based on the Mine Safety and Health Administration's (MSHA's) data. However, in 2009, MSHA reported about 400,000 employee hours in the sand and gravel industry (Solis and Main, 2009). Based on these employee hours, an estimate of about 7 million metric tons of sand and gravel was produced in the Commonwealth in 2009.

In 2009, the significant production of portland cement in Puerto Rico would rank the Commonwealth 20th, if ranked in comparison with the 36 portland cement-producing States in the Nation. Puerto Rico would rank 29th out of 38 in common clay and 32d of all the States in crushed stone, again, if compared with the producing States of each mineral commodity. Salt production value and quantity remained the same as 2008.

Of the U.S. Administered Islands, only American Samoa, Guam, and the Virgin Islands have reported nonfuel mineral production data for 2009, and this was limited to crushed stone (table 1).

[1]Data on nonfuel raw mineral production were reported from several of the Administered Islands to the USGS. Only aggregated crushed stone data for the island of Guam of the Pacific Island Possessions and the same for the U.S. Virgin Islands southeast of Puerto Rico are nonproprietary; these data appear in table 1.

[2]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN THE COMMONWEALTH OF PUERTO RICO AND ISLANDS ADMINISTERED BY THE UNITED STATES[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Puerto Rico:						
Cement, portland	1,390	W	1,300	W	936	W
Clays, common	96	547	75	437	54	328
Lime[e]	11	2,250	11	998	11	1,750
Salt	45	1,500	45	1,500	45	1,500
Stone, crushed	13,400	100,000	11,000 [r]	96,000 [r]	8,370	68,700
Total	XX	105,000	XX	98,900 [r]	XX	72,300
Administered Islands:						
American Samoa, stone, crushed	W	W	W	W	W	W
Guam, stone, crushed	329	3,760	325	3,780	296	3,380
Virgin Islands, stone, crushed	W	W	W	W	W	W
Total	XX	3,760	XX	3,780	XX	3,380

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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RHODE ISLAND

Source: Rhode Island Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF RHODE ISLAND

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Rhode Island Geological Survey for collecting information on all nonfuel minerals.

In 2009, Rhode Island's nonfuel mineral production[1] value was at $43 million, based upon annual U.S. Geological Survey data. This was a $1.9 million, or 4%, decrease from the State's total production value of $45 million in 2008, which was down by $7.1 million, or almost 14%, from $52 million in 2007. Because data for industrial sand and gravel have been withheld to avoid disclosing company proprietary data, the State's actual total nonfuel mineral production values for 2007–09 are higher than those reported in table 1. The State decreased to rank 49th out of the 50 States for total nonfuel raw mineral production value, down from 48th in 2007–08.

Construction sand and gravel and crushed stone were Rhode Island's leading mineral commodities by value in 2009, accounting for almost 54% and 46% of the State's total, respectively. The $4.1 million decline in the production value of construction sand and gravel was the primary driver of the total decrease in total production value in the State in 2009, being offset only partially by the $2.3 million increase in the production value of crushed stone.

Almost 27% of all construction sand and gravel produced in the State was used as asphaltic concrete aggregates and road base materials, down from 35% in 2008. This is the largest known major use category by value and accounts for almost 15% of the State's total nonfuel mineral production value, down from 16% in 2008. The next largest known major use category by production and production value for construction sand and gravel was for concrete aggregates and concrete products, accounting for 8% of all material produced and 9% of the State's total nonfuel mineral production value. Additional data for crushed stone and construction sand and gravel are subdivided in tables 2, 3, and 4.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN RHODE ISLAND[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	2,410	31,200	2,000 r	27,400 r	1,820	23,300
Industrial	W	W	W	W	W	W
Stone, crushed	2,240	21,200	1,840 r	17,900 r	1,820	20,200
Total	XX	52,400	XX	45,300 r	XX	43,400

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
RHODE ISLAND: CRUSHED STONE SOLD OR USED, BY TYPE[1]

	2008			2009		
Type	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Miscellaneous stone	7	1,840 r	$17,900 r	6	1,820	$20,200

rRevised.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
RHODE ISLAND: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Filter stone	W	W
Other coarse aggregate	18	320
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Other graded coarse aggregate	127	224
Fine aggregate (-⅜ inch), other	18	320
Coarse and fine aggregates, other	18	320
Agricultural, limestone	W	W
Unspecified:[2]		
Reported	510	4,950
Estimated	1,120	12,000
Total	1,820	20,200

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
RHODE ISLAND: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)[2]	295	$4,050	$13.73
Asphaltic concrete aggregates and road base materials	498	6,420	12.88
Other miscellaneous uses[3]	118	1,540	13.01
Unspecified:[4]			
Reported	13	36	2.77
Estimated	896	11,200	12.54
Total or average	1,820	23,300	12.79

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes fill and snow and ice control.
[4]Estimated production without a breakdown by end use.

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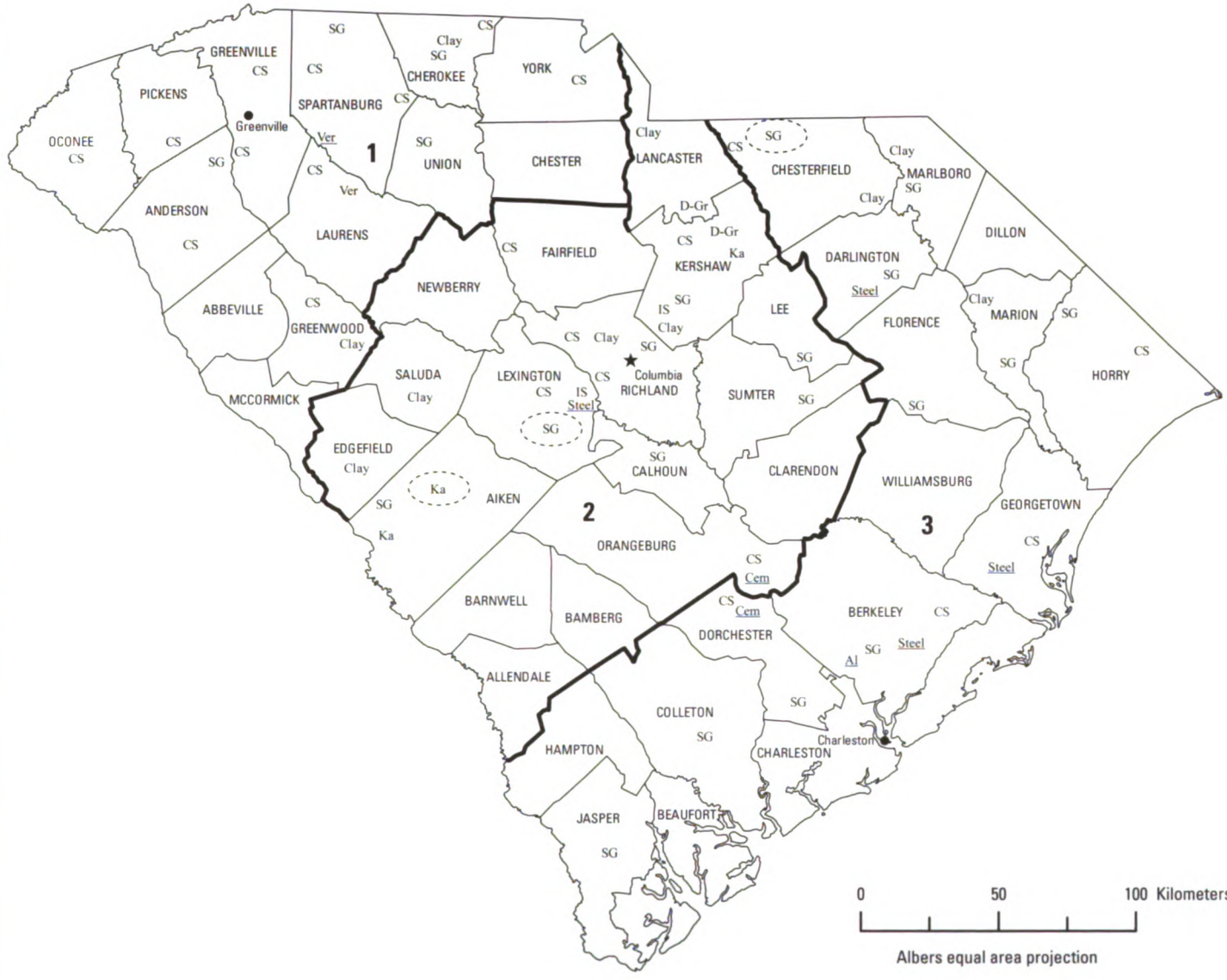
SOUTH CAROLINA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Al	Aluminum plant
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-Gr	Dimension granite
IS	Industrial sand
Ka	Kaolin
SG	Construction sand and gravel
Steel	Steel plant
Ver	Vermiculite
Ver	Vermiculite plant

Concentration of mineral operations

Source: South Carolina Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF SOUTH CAROLINA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the South Carolina Geological Survey for collecting information on all nonfuel minerals.

In 2009, South Carolina's nonfuel raw mineral production[1] was valued at $449 million, based upon annual U.S. Geological Survey (USGS) data. This was a $193 million, or a 30%, decrease from the State's total nonfuel mineral value of $642 million in 2008, which was down by $166 million, or almost 21%, from $808 million in 2007. South Carolina declined to 35th from 33d in 2008, which in turn was down from 26th in 2007, in rank among the 50 States in total nonfuel mineral production value. The State accounted for 0.76% of the total U.S. nonfuel mineral production of $59 billion in 2009, a decrease from accounting for 0.9% of the $71.3 billion total in 2008, which in turn was down from 1.15% of the $70 billion in 2007. [Because data for crude mica (2007–08) and crude vermiculite (2007–09) have been withheld (company proprietary data), the actual total production values for the State are higher than those reported in table 1.]

Construction minerals and materials constituted the majority of South Carolina's nonfuel mineral production. In descending order of total value, crushed stone, portland cement, and construction sand and gravel were the State's top three mineral commodities, accounting for 90% of the State's total nonfuel mineral production value. These three were followed by masonry cement and industrial sand and gravel. These five mineral commodities accounted for 98% of the State's total nonfuel mineral production value.

Excluding fire clay and crude mica, neither of which was produced in the State in 2009, and gemstones, for which production values remained significantly unchanged from 2007–08, South Carolina saw a decrease in every mineral commodity for both quantities produced and production value. Three of the State's leading mineral commodities—portland cement, crushed stone, and masonry cement—had the greatest decreases in production value, down $115 million, or 40%, $34 million, or 14%, and more than $19 million, or 47%, respectively. Other significant decreases in production value of more than $1 million took place in industrial sand and gravel, down $7.1 million, and kaolin clays, down $2.7 million. The production and production value of crude vermiculite (actual values withheld—company proprietary data) were down 38% and 54%, respectively. By tonnage, the greatest decreases in the State took place in crushed stone, down 4.3 million metric tons (Mt), and construction sand and gravel, down 3.8 Mt. Combined, production of both of these commodities totaled 24 Mt in 2009, down from 32 Mt in 2008, or 25%.

South Carolina continued to be the top producing State of vermiculite. The only other vermiculite-producing State in 2009 was Virginia. South Carolina remained second of nine States in the production of kaolin clay, ranking behind Georgia. The State decreased from 2d in 2008 to 6th in 2009 in the production of masonry cement and from 9th to 10th in the production of portland cement.

Primary aluminum and raw steel also were produced in the State from raw materials from foreign and other domestic sources. Aluminum was produced at a facility in Berkeley County, north of Charleston. Steel was produced at facilities in Berkeley, Darlington, Lexington, and Georgetown Counties. In 2009, South Carolina ranked fourth in the production of primary aluminum, up from seventh in 2007–08, among the 10 aluminum-producing States, despite an almost 4% decrease in production and 36% decrease in production value.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters —mineral commodity, State, and country— can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH CAROLINA[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	491	60,100 e	323	41,600 e	174	22,000 e
Portland	3,680	355,000 e	2,930	284,000 e	1,870	169,000 e
Clays:						
Common	826	3,990	461	2,130	311	1,300
Fire	37	83	29	66	--	--
Kaolin	297	17,600	199	11,300	144	8,590
Gemstones, natural	NA	1	NA	1	NA	1
Mica, crude	W	W	W	W	--	--
Sand and gravel:						
Construction	10,500 r	57,700 r	9,660 r	46,500 r	5,900	32,900
Industrial	837	22,000	679	21,100	441	14,000
Stone:						
Crushed	30,400	290,000	22,500	235,000	18,200	201,000
Dimension	9	850	4	472	3	401
Vermiculite	W	W	W	W	W	W
Total	XX	808,000 r	XX	642,000 r	XX	449,000

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable. -- Zero.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
SOUTH CAROLINA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone	5	2,830	$28,200	5	2,130	$22,000
Calcareous marl	3	3,500	19,700	3	2,480	14,000
Granite	23	15,800	181,000	23	13,100	159,000
Miscellaneous stone	1	370	5,280	1	418	5,520
Total	XX	22,500	235,000	XX	18,200	201,000

XX Not applicable.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 3
SOUTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	86	985
Filter stone	W	W
Other coarse aggregate	287	5,290
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	1,740	29,000
Fine aggregate (-¾ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	175	1,210
Other fine aggregate	2,140	28,200
Coarse and fine aggregates:		
Graded road base or subbase	534	4,750
Crusher run or fill or waste	283	1,960
Other coarse and fine aggregates	2,160	23,400
Agricultural, limestone	W	W
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]		
Reported	6,280	70,000
Estimated	2,620	18,000
Total	18,200	201,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
SOUTH CAROLINA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregate[5]	W	W	W	W	W	W
Agricultural[6]	--	--	--	--	W	W
Chemical and metallurgical[7]	--	--	--	--	W	W
Unspecified:[8]						
Reported	2,100	25,100	953	9,900	3,220	34,900
Estimated	--	--	1,480	8,580	1,130	9,400
Total	6,130	73,500	5,350	54,300	6,690	72,900

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregates.

[5]Includes crusher run or fill or waste, graded road base or subbase, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement manufacture.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
SOUTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	2,710	$15,500	$5.72
Asphaltic concrete aggregates and road base materials[3]	308	1,540	4.99
Fill	424	1,050	2.47
Golf course	46	850	18.48
Other miscellaneous uses[4]	58	402	6.93
Unspecified:[5]			
Reported	1,110	6,680	6.05
Estimated	1,250	6,880	5.49
Total or average	5,900	32,900	5.57

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes filtration and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6
SOUTH CAROLINA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	1,630	7,760	W	W
Asphaltic concrete aggregates and road base materials[3]	W	W	76	344	W	W
Fill	--	--	129	325	296	724
Other miscellaneous uses[4]	138	903	43	355	1,240	8,910
Unspecified:[5]						
Reported	--	--	31	172	1,070	6,510
Estimated	75	464	185	1,140	993	5,270
Total	213	1,370	2,090	10,100	3,600	21,400

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes filtration, golf course, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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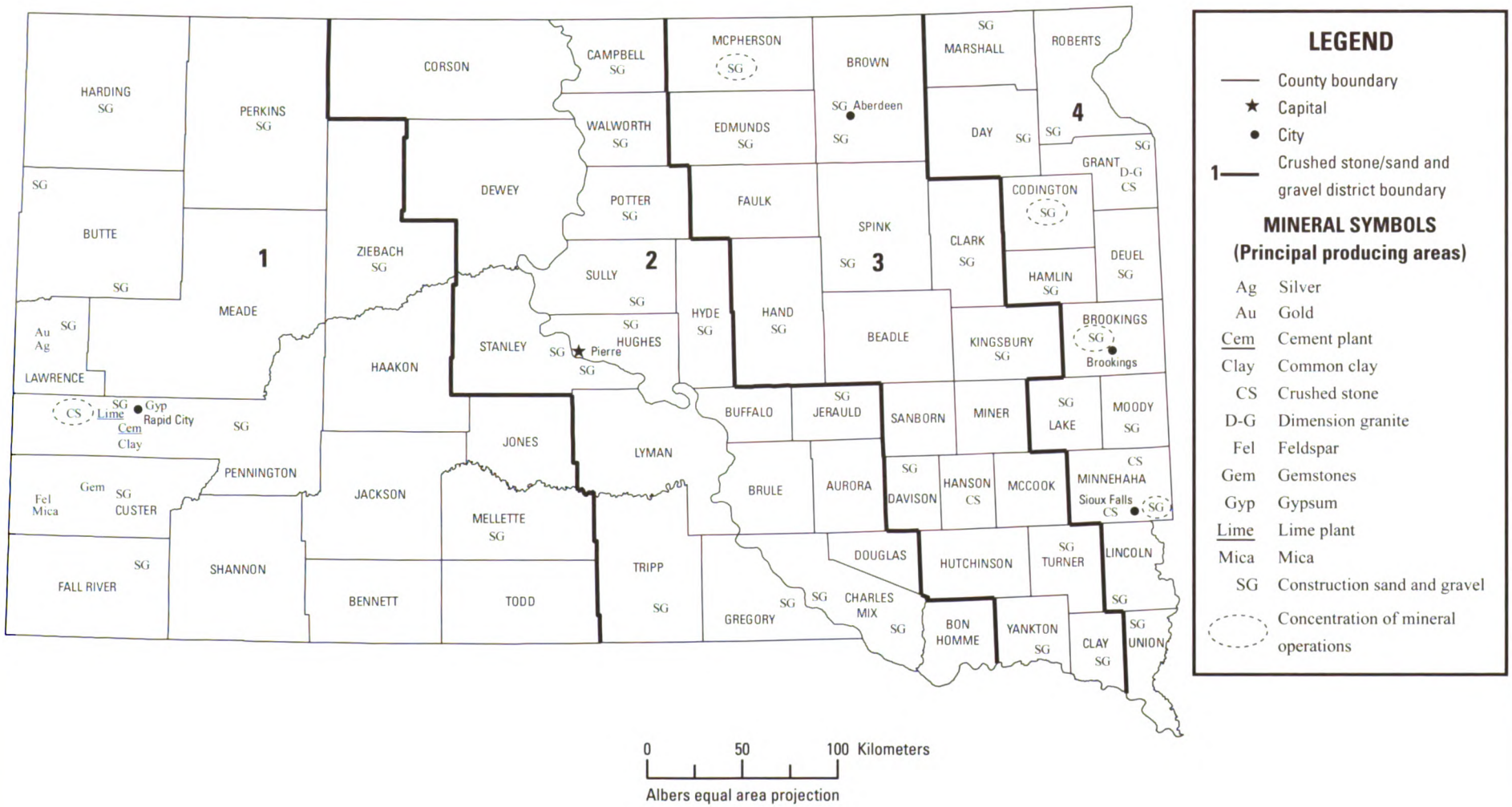
SOUTH DAKOTA



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Ag	Silver
Au	Gold
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
Fel	Feldspar
Gem	Gemstones
Gyp	Gypsum
Lime	Lime plant
Mica	Mica
SG	Construction sand and gravel
⬭	Concentration of mineral operations

Source: South Dakota Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF SOUTH DAKOTA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the South Dakota Geological Survey for collecting information on all nonfuel minerals.

In 2009, South Dakota's nonfuel raw mineral production[1] was valued at $230 million, based upon annual U.S. Geological Survey (USGS) data. This was a $16.6 million, or 6.7%, decrease from the State's total nonfuel mineral production value for 2008, which decreased by $16.5 million, or 6.3%, from 2007 to 2008. The State remained 39th among the 50 States in total nonfuel mineral production value. The State rose to 12th from 13th in the Nation for the per capita production value of its nonfuel mineral industry; with a population of about 812,000, the production value per capita was about $283.

In 2009, the State's leading mineral commodity, by production value, was gold. This was the first time gold had been the State's leading mineral commodity since 2002, when it was second to portland cement. Prior to 2002, gold had been the State's leading mineral commodity for more than four decades. In descending order of production value, the State's top four mineral commodities were gold, portland cement, construction sand and gravel, and crushed stone.

The State's largest increase in production value took place in gold, up by more than 20%. Smaller, yet significant, increases also took place in dimension stone, lime, and iron ore (for use in cement manufacture). The most significant decline in production value took place in portland cement (actual data withheld—company proprietary data), followed by smaller decreases in construction sand and gravel, down by more than $10 million, and crushed stone, down by about $5 million.

Gold was the only mineral commodity to see a significant increase in production quantity, up by more than 10%. Significant decreases in production quantity took place in three of the State's highest producing mineral commodities—portland cement, down by more than 25%; crushed stone, down by 17%; and construction sand and gravel, down by 16%. Significant decreases in production quantity also took place in crude mica, down by about 47%, and crude gypsum, down by about 40%.

South Dakota continued to lead the Nation in the production quantity of crude mica among four producing States. The State continued to be ranked 3d in the production of iron ore among 4 producing States; ranked 7th in the production of feldspar and gold among 7 and 11 producing States, respectively; and ranked 25th in the production of gemstones (gemstones based on production value) among 50 producing States. The State rose in rank to 13th from 15th in the production of dimension stone, to 22d from 24th in the production of common clays, and to 22d from 25th in the production of lime. The State ranked seventh in the production of silver.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN SOUTH DAKOTA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	151	W	155	W	W	W
Sand and gravel, construction	14,300 r	52,000 r	12,500 r	48,000 r	10,500	37,900
Silver kilograms	--	--	--	--	8,570	4,040
Stone, crushed	5,430	36,600	5,390	34,300	4,450	29,300
Combined values of cement (portland), feldspar, gemstones (natural), gold, gypsum (crude), iron ore (usable shipped), lime, mica (crude), stone (dimension granite), and values indicated by symbol W	XX	175,000	XX	165,000 r	XX	159,000
Total	XX	263,000 r	XX	247,000 r	XX	230,000

r Revised. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable. -- Zero.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	4	2,830	$12,800	4	2,470	$14,200
Granite	-- r	-- r	-- r	--	--	--
Sandstone and quartzite	3	2,120	19,300	3	1,970	15,000
Slate	-- r	-- r	-- r	--	--	--
Miscellaneous stone	3	446	2,210	1	3	20
Total	XX	5,390	34,300	XX	4,450	29,300

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Chemical and metallurgical, cement manufacture	(2)	(2)
Unspecified:[3]		
Reported	2,780	18,300
Estimated	1,670	11,000
Total	4,450	29,300

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Withheld to avoid disclosing company proprietary data; included with "Unspecirfied: Reported."
[3]Reported and estimated production without a breakdown by end use.

TABLE 4
SOUTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1, 2]

(Thousand metric tons and thousand dollars)

Use	District 1 Quantity	District 1 Value	District 3 Quantity	District 3 Value	District 4 Quantity	District 4 Value
Chemical and metallurgical[3]	(4)	(4)	--	--	--	--
Unspecified:[5]						
Reported	1,230	6,060	443	4,510	1,110	7,740
Estimated	1,250	8,190	--	--	422	2,780
Total	2,480	14,300	443	4,510	1,530	10,500

-- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]No production for District 2.
[3]Includes cement manufacture.
[4]Withheld to avoid disclosing company proprietary data; included with "Unspecified: Reported."
[5]Reported and estimated production without a breakdown by end use.

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TABLE 5
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)[2]	544	$3,330	$6.12
Asphaltic concrete aggregates and other bituminous mixtures	227	778	3.43
Road base and coverings[3]	2,950	7,960	2.69
Fill	124	261	2.10
Other miscellaneous uses[4]	60	428	7.13
Unspecified:[5]			
Reported	758	3,880	5.12
Estimated	5,870	21,200	3.62
Total or average	10,500	37,900	3.59

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement and lime).
[4]Includes filtration and snow and ice control.
[5]Reported and estimated production without a breakdown by end use.

TABLE 6
SOUTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	Districts 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	W	W	160	883	W	W
Asphaltic concrete aggregates and road base materials[3]	240	973	240	830	336	825
Fill	--	--	11	18	35	94
Other miscellaneous uses[4]	34	364	(5)	2	22	158
Unspecified:[6]						
Reported	97	422	87	989	86	309
Estimated	1,230	4,270	1,750	6,140	1,230	4,310
Total	1,600	6,030	2,250	8,860	1,710	5,690

Use	District 4		Unspecified districts	
	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	369	2,320	--	--
Asphaltic concrete aggregates and road base materials[3]	2,150	5,520	217	588
Fill	78	149	--	--
Other miscellaneous uses[4]	19	32	--	--
Unspecified:[6]				
Reported	489	2,160	--	--
Estimated	1,660	6,520	--	--
Total	4,760	16,700	217	588

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (cement and lime).
[4]Includes filtration and snow and ice control.
[5]Less than ½ unit.
[6]Reported and estimated production without a breakdown by end use.

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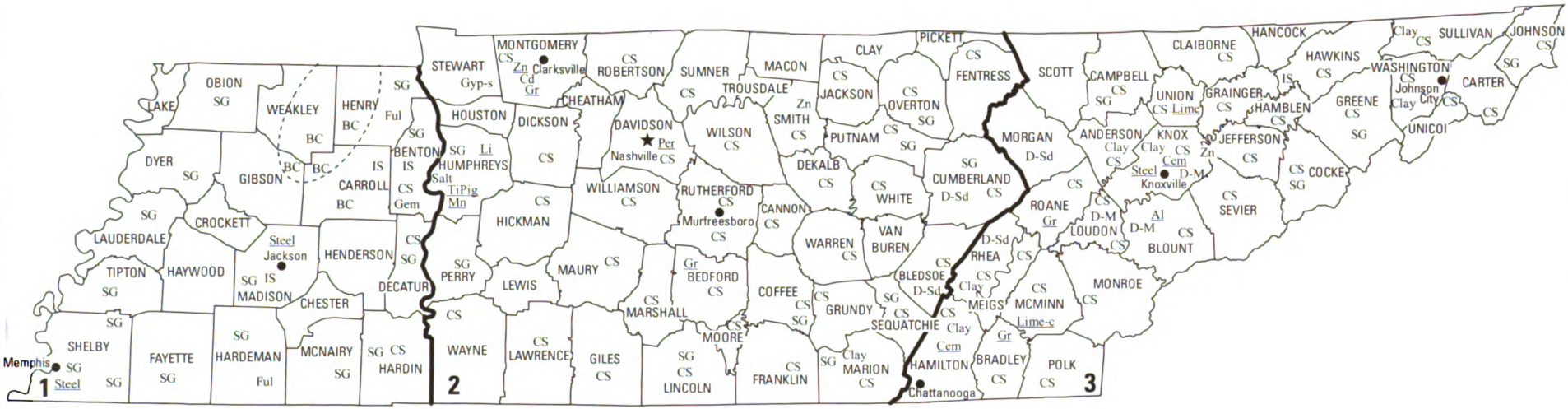
TENNESSEE



0 50 100 Kilometers

Albers equal area projection

LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Al	Aluminum plant
BC	Ball clay
Cd	Cadmium (byproduct)
Cem	Cement plant
Clay	Common clay or shale
CS	Crushed stone
D-M	Dimension marble
D-Sd	Dimension sandstone
Ful	Fuller's earth
Gem	Gemstones
Gr	Graphite plant
Gyp-s	Synthetic gypsum
IS	Industrial sand
Li	Lithium plant
Lime	Lime plant
Lime-c	Lime plant - captive
Mn	Manganese plant
Per	Perlite
Salt	Salt
SG	Construction sand and gravel
Steel	Steel plant
TiPig	Titanium pigment plant
Zn	Zinc
Zn	Zinc plant
	Concentration of mineral operations

Source: Tennessee Department of Environment and Conservation/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF TENNESSEE

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Tennessee Department of Environment and Conservation, Division of Geology, for collecting information on all nonfuel minerals.

In 2009, Tennessee's nonfuel raw mineral production[1] was valued at $675 million, based upon annual U.S. Geological Survey (USGS) data. This was a $184 million, or 21%, decrease from the State's total nonfuel mineral production value for 2008, $859 million, which followed a $133 million, or 13%, decrease from the total $992 million in 2007. Tennessee remained 26th in rank among the 50 States in total nonfuel mineral production value and accounted for 1.14% of the total U.S. nonfuel mineral production value of $59 billion, down from 1.20% in 2008.

Crushed stone remained the leading nonfuel mineral commodity by production value in Tennessee, followed by portland cement, construction and industrial sand and gravel, and lime, in descending order of value. These five mineral commodities accounted for almost 94% of the State's total 2009 raw nonfuel mineral production value, with crushed stone alone making up nearly 64% of the total, an increase from 54% in 2008. The only increase in production value that took place in the State in 2009 took place with dimension stone, up by 82% from that of 2008 (actual production value data withheld—company proprietary data). However, this increase offset only a small fraction of the total $184 million decrease in production value from 2008 to 2009.

The greatest decrease in production values took place with zinc, crushed stone, and portland cement. With the closure or idling of many of the State's zinc operations in 2008 and early 2009 owing to declining zinc prices and the economic recession, the production value of zinc was down almost 94% from that of 2008. Total U.S. mine production of recoverable zinc was down only 5% from that of 2008, with 93% of production coming from the State of Alaska (Tolcin, 2011, p. 84.1).

The production value of crushed stone, $431 million, was down $30 million from $461 million in 2008, which in turn was down $98 million from $559 million in 2007—an almost 23% decline in 2 years. Similarly, the production value of portland cement decreased almost 20% from 2008 to 2009, which had been preceded by a 23% decline from 2007 to 2008 (production value data withheld—company proprietary data). Other mineral commodities saw significant declines, including: construction sand and gravel, down $13.4 million; industrial sand and gravel, down $5.7 million; and ball clays, down $3.1 million. Masonry cement, cadmium content of zinc concentrates, gemstones, lime, and salt were down a combined $12 million in 2009.

Tennessee remained the Nation's leading producer of ball clay. In 2009, Tennessee produced 61% of the Nation's total ball clay production. The State remained 11th in industrial sand and gravel production, but declined from 16th to 17th in masonry cement production. After dropping from 10th in 2007 to 15th in 2008, the State rose to 12th in crushed stone production in 2009, accounting for 3% of all crushed stone produced in the United States.

Since at least 1994, Tennessee had ranked first in the Nation among all gemstone-producing States (gemstones based upon value). In 2009, the State declined in rank to 10th.

Aluminum, manganese, lithium, titanium pigments, graphite, and raw steel were produced in Tennessee in 2009 but were processed from materials obtained from other domestic and foreign sources. The State continued to rank eighth in the production of primary aluminum, due to the Alcoa Inc. facility south of Knoxville, in Blount County. Titanium pigments were produced by E.I. du Pont de Nemours and Company in New Johnsonville, Humphreys County.

The Tennessee Division of Geology (TDG) provided the following narrative information. Data and information in the text are those reported by the TDG, based upon its own surveys and estimates.

Based on review of the National Pollutant Discharge Elimination System Database managed by the Tennessee Division of Water Pollution Control, Mining Section, there were approximately 329 active permits for nonfuel mineral operations in 82 counties across the State in 2009. The active permits represent both quarry and plant sites, some of which may not have had any production during 2009.

Commodity Review

Industrial Minerals

Clays.—Ball clay and kaolin were mined from the Eocene-age Claiborne and Wilcox Formations in Carroll, Gibson, Henry, and Weakly Counties in northwest Tennessee. Companies operating in the State were Boral Bricks Inc., H.C. Spinks Clay Company Inc. (owned by Franklin Minerals Inc.), Kentucky-Tennessee Clay Co. (a subsidiary of IMERYS Minerals Ltd.), Old Hickory Clay Co., and United Clays Inc. (owned by Unimin Corp.). Fuller's earth (montmorillonite) was mined in Hardeman County by Moltan Co. and in Henry County by American Colloid Co.

General Shale Brick Inc. [Johnson City, TN (the U.S. subsidiary of Wienerberger AG, of Vienna, Austria)], the

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

Peter Lemiszki, Chief Geologist with the Tennessee Department of Environment and Conservation, Division of Geology, authored the text of the State mineral industry information provided by that agency.

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Nation's largest brick manufacturer, operated nine shale mines in Anderson, Knox, Rhea, Sullivan, and Washington Counties in eastern Tennessee to supply its brick production plants. After closing a mine site in Carter County and opening the Kitty Hollow and Spring City shale mines in Rhea County in 2008, the company opened a new production facility in Spring City in 2009. At full capacity, the plant was estimated to produce about 2 million bricks per week. In December 2009, the company opened a new showroom and distribution facility near Knoxville by combining two older facilities that had been at two separate locations in the city (Kirchner, 2008).

Gemstones.—The freshwater pearl was designated the official Tennessee State Gem in 1979. The American Pearl Co. in Benton County operated the only freshwater pearl farm in North America. American Shell Co., Tennessee Shell Co., and The American Pearl Co. exported mollusk shells from the Tennessee River to pearl-producing countries.

Sand and Gravel, Construction.—There were 86 construction sand and gravel operations in 29 counties managed by 52 different companies and 2 county highway departments in Tennessee in 2009. Companies operating at least five sites were Ford Construction Co., Memphis Stone and Gravel Co., and Standard Construction Co. located in District 1 (western Tennessee) and American Sand Company, LLC, located in District 2 (middle Tennessee).

Sand and Gravel, Industrial.—Industrial sand was mined in Hawkins County by Short Mountain Silica Co., in Benton and Carroll Counties by Unimin Corp., and in Madison County by Teague Transports, LLC.

Stone, Crushed.—There were 153 permitted crushed stone industry operations in 2009. Dolomite and limestone were produced at approximately 150 quarries and underground mines located primarily in District 2 (middle Tennessee) and District 3 (eastern Tennessee). Three quarries in Johnson County produced either crushed granite or quartzite. The top three producers were Vulcan Materials Co., Rogers Group Inc., and Aggregates USA, LLC.

Stone, Dimension.—The Ordovician-age Holston Limestone was quarried for dimension marble in Blount, Knox, and Loudon Counties by the Tennessee Marble Co. and Tennessee Marble Products Co. Six companies operated six dimension sandstone quarries in the Pennsylvanian-age Crab Orchard Sandstone in Bledsoe, Cumberland, Morgan, and Rhea Counties.

Other Industrial Minerals.—Synthetic gypsum was produced from Tennessee Valley Authority byproducts at the Allied Custom Gypsum plant in Stewart County. Lime plants operated by Abitibi Bowater Inc. in McMinn County produced high-calcium quicklime, for captive consumption only. Carmeuse Lime & Stone, which had been created in 2008 through the acquisition of Oglebay Norton Co. by Carmeuse North America, produced high-calcium quicklime and hydrated lime at its Tennessee-Luttrell plant in Union County.

Metals

Zinc.—The zinc mining industry in Tennessee was just starting its revival when the economic recession forced the halt to production at mines located in the middle and eastern Tennessee zinc mining districts in 2008 and in early 2009. The industry in the State saw steady production increases after restarting.

In May 2009, Nyrstar N.V. completed the acquisition of the Gordonsville, Cumberland, and Elmwood zinc mines in Smith County from Mid-Tennessee Zinc Corp. (subsidiary of Strategic Resource Acquisition Corp.) (Nyrstar N.V., 2009a). Subsequently, in December, the company completed the acquisition of the Coy and Young mines in Jefferson County and the Immel Mine in Knox County from the East Tennessee Zinc Company (a subsidiary of the Glencore Group) for $126 million (Nyrstar N.V., 2009b).

Nyrstar intended to increase production at their newly acquired Tennessee mines to full production by the end of 2010. At full production, the Nyrstar mines will be capable of producing approximately 210,000 metric tons per year of zinc concentrate, grading approximately 62% zinc. Mine output was anticipated to be sufficient to fully supply Nyrstar's zinc smelting and alloying plant in Clarksville, Montgomery County, which was the only primary zinc producer in the U.S. The plant responded to the downturn in zinc demand rapidly at the end of 2008 by reducing production of refined zinc by 40% (Nyrstar N.V., 2008). Nyrstar estimated that the current reserves across all of its Tennessee mines indicated a mining lifespan of 15 years and have a record of one-for-one reserve replacement.

The Tennessee Department of Labor and Workforce Development announced that U.S. Zinc in Clarksville, Montgomery County, was chosen to receive the Governor's Award of Excellence for Workplace Safety. U.S. Zinc manufactured zinc-oxide and zinc-sulfide inorganics. The facility qualified for the Governor's Award by working more than 250,000 hours without a lost-time or restricted duty incident (Tennessee Department of Labor and Workforce Development, 2009).

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN TENNESSEE[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Ball	677	30,600	568	25,900	511	22,800
Common	199	1,360	155	1,090	113	816
Sand and gravel:						
Construction	7,640 r	54,500 r	7,180 r	56,200 r	5,360	42,800
Industrial	1,070	32,400	983 r	32,800	783	27,100
Stone, crushed	63,400	559,000	46,200	461,000	40,100	431,000
Combined values of cadmium (byproduct from zinc concentrates), cement, clays (fuller's earth), gemstones (natural), lime, salt, stone (dimension marble), zinc	XX	315,000	XX	281,000 r	XX	150,000
Total	XX	992,000 r	XX	859,000 r	XX	675,000

r Revised. XX Not applicable.

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2] Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
TENNESSEE: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	118	44,600	$445,000	123	38,600	$408,000
Sandstone and quartzite	7	1,150	13,500	6	1,070	18,100
Miscellaneous stone	1	454	2,380	1	454	4,920
Total	XX	46,200	461,000	XX	40,100	431,000

XX Not applicable.

[1] Data are rounded to no more than three significant digits; may not add to totals shown.

[2] Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
TENNESSEE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	228	3,140
Filter stone	101	959
Other coarse aggregate	1,120	13,200
Coarse aggregate, graded:		
Concrete aggregate, coarse	451	4,710
Bituminous aggregate, coarse	713	7,810
Bituminous surface-treatment aggregate	W	W
Railroad ballast	297	2,230
Other graded coarse aggregate	7,700	95,900
Fine aggregate (-¾ inch):		
Stone sand, concrete	178	1,850
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	151	1,460
Other fine aggregate	2,310	33,300
Coarse and fine aggregates:		
Graded road base or subbase	1,280	10,100
Unpaved road surfacing	W	W
Crusher run or fill or waste	345	2,530
Other coarse and fine aggregates	7,690	75,500
Other construction materials	120	1,240
Agricultural, limestone	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Glass manufacture	W	W
Sulfur oxide removal	W	W
Unspecified:[2]		
Reported	9,650	95,900
Estimated	6,210	62,400
Total	40,100	431,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
TENNESSEE: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	529	5,470	W	W
Coarse aggregate, graded[3]	W	W	4,170	44,300	W	W
Fine aggregate (-⅜ inch)[4]	W	W	917	11,300	W	W
Coarse and fine aggregate[5]	W	W	3,470	28,600	W	W
Other construction materials	--	--	120	1,240	--	--
Agricultural[6]	W	W	W	W	W	W
Chemical and metallurgical[7]	--	--	W	W	W	W
Unspecified:[8]						
Reported	--	--	8,190	80,400	1,460	15,500
Estimated	--	--	5,610	56,400	597	5,910
Total	2,950	34,700	23,400	233,000	13,800	164,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregates.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregates.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone.

[7]Includes cement and glass manufacture, and sulfur oxide removal.

[8]Reported and estimated production without a breakdown by end use.

TABLE 5
TENNESSEE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)[2]	1,300	$11,400	$8.78
Asphaltic concrete aggregates and road base materials[3]	789	5,670	7.19
Other miscellaneous uses[4]	85	1,210	14.21
Unspecified:[5]			
Reported	404	2,730	6.76
Estimated	2,790	21,800	7.82
Total or average	5,360	42,800	7.98

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes fill and golf course sand.

[5]Reported and estimated production without a breakdown by end use.

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TABLE 6
TENNESSEE: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	712	4,570	W	W	W	W
Asphaltic concrete aggregates and road base materials[3]	650	3,490	--	--	140	2,180
Fill	20	105	--	--	--	--
Other miscellaneous uses[4]	--	--	478	4,510	337	4,570
Unspecified:[5]						
Reported	244	1,610	W	W	W	W
Estimated	1,140	9,360	1,420	10,600	225	1,850
Total or average	2,770	19,100	1,900	15,100	702	8,600

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes fill and golf course sand.

[5]Reported and estimated production without a breakdown by end use.

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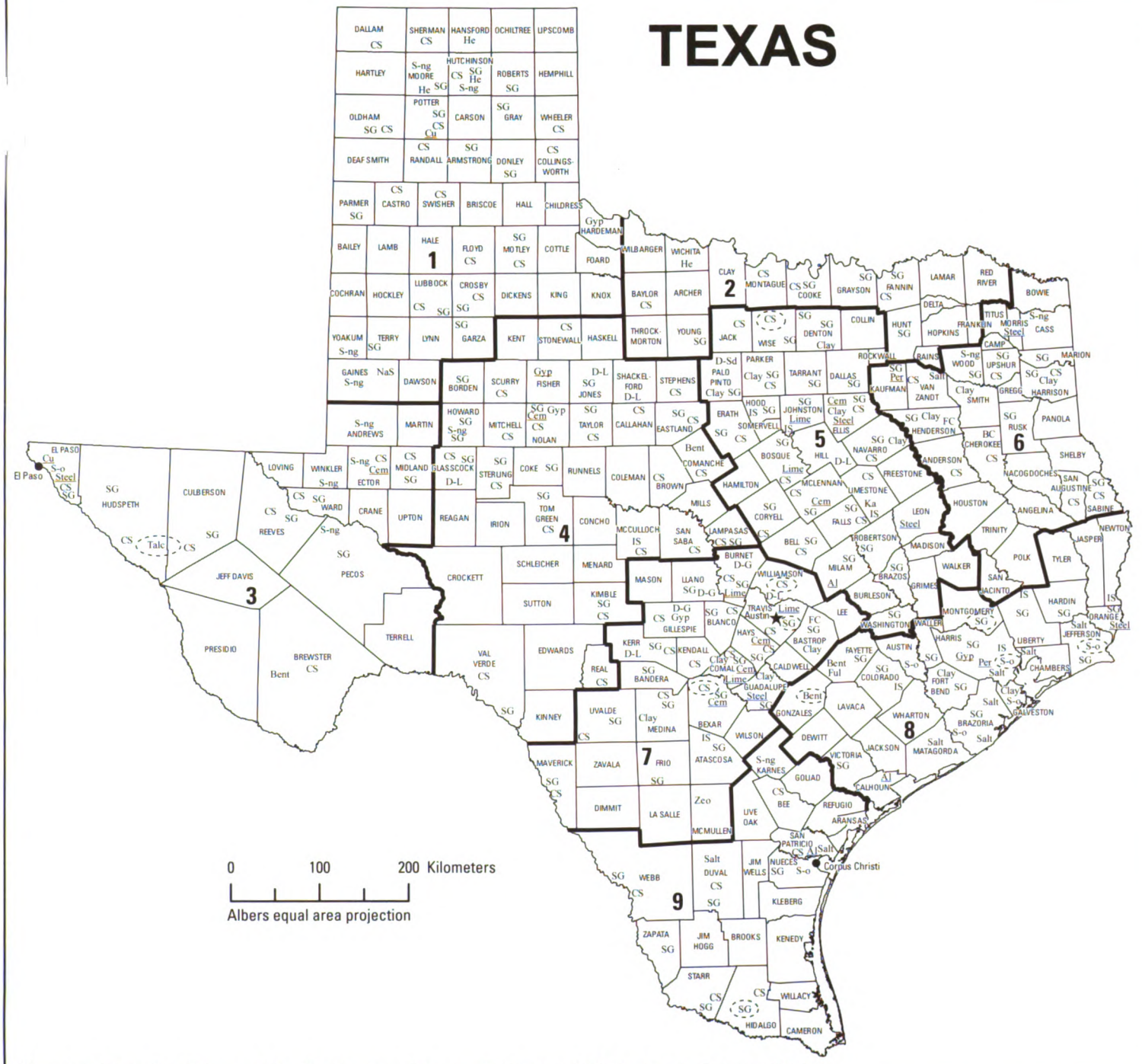

LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Al	Aluminum plant
BC	Ball clay
Bent	Bentonite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper plant
D-G	Dimension granite
D-L	Dimension limestone
D-Sd	Dimension sandstone
FC	Fire clay
Ful	Fuller's earth
Gyp	Gypsum
Gyp	Gypsum plant
He	Helium
IS	Industrial sand
Ka	Kaolin
Lime	Lime plant
Per	Perlite plant
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
Salt	Salt
NaS	Sodium sulfate
SG	Sand and gravel
Steel	Steel plant
Talc	Talc
Zeo	Zeolites

Concentration of mineral operations

Source: University of Texas at Austin, Bureau of Economic Geology/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF TEXAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Texas Bureau of Economic Geology at University of Texas at Austin, for collecting information on all nonfuel minerals.

In 2009, Texas nonfuel raw mineral production[1] was valued at $2.65 billion, based upon annual U.S. Geological Survey (USGS) data. This was a 23% decrease from the State's total nonfuel mineral value of almost $3.45 billion for 2008, which followed a $131 million, or 3.9%, increase from 2007 to 2008. In 2009, Texas ranked sixth among the 50 States in total nonfuel mineral production value for the second consecutive year, accounting for about 4.5% of the U.S. total value. The top three mineral commodities produced in the State were portland cement, crushed stone, and construction sand and gravel, in descending order of value. These three mineral commodities represented 81% of the State's total nonfuel mineral value.

In 2009, only four mineral commodities produced in Texas increased in production value—dimension stone, up by $14.3 million; salt, up by almost $7.9 million; zeolites; and crude talc (actual production value data withheld—company proprietary data) in descending order of production value. The production value of gemstones remained the same from 2008 to 2009. All other mineral commodities produced in the State declined in production value, led by decreases in crushed stone, down $316 million; and portland cement, down $297 million. Other significant decreases in 2009 in the production value of mineral commodities, in descending order of the decrease, included industrial sand and gravel, down by $54 million; lime, down by $23 million; masonry cement, down by $12 million; gypsum, down by $4.5 million; and bentonite clay, down by almost $3.4 million. Smaller, yet significant, decreases took place in the production values of ball clays, fuller's earth (montmorillonite), kaolin, and both crude and Grade-A helium (actual production values withheld for these five mineral commodities—company proprietary data).

Zeolites were the only mineral commodity that increased in production quantity in 2009 (actual data withheld—company proprietary data). Helium production remained the same from 2008 to 2009 (actual data withheld—company proprietary data). Texas began producing fire clay and stopped producing brucite in 2009. All other mineral commodities produced in the State decreased in the quantity of production, led by decreases in the quantities of crushed stone, down by 39.4 million metric tons (Mt), or 26%; construction sand and gravel, down by 18.3 Mt, or 21%; and portland cement, down by 2.7 Mt, or 25%.

In 2009, Texas continued to lead the Nation in production quantity of dimension stone, common clay, portland cement, and crushed stone, producing 14.6%, 14.5%, 13.5%, and 9.5% of the Nation's total quantity, respectively. This is the 2d consecutive year that the State has led production in dimension stone and common clay, the 4th consecutive year the State has led in the production of portland cement, and the 12th consecutive year the State has led in the production of crushed stone. Texas remained the second leading producer of salt, construction sand and gravel (accounting for 21% and 8.4% of the U.S. total, respectively), ball clay, crude helium, and crude talc (actual quantity data withheld—company proprietary data). The State also remained third in Grade-A helium and zeolites, and fifth in bentonite clay. Texas rose in rank to third from fifth in the production of crude gypsum and to fourth from fifth in the production of masonry cement. Texas lowered in rank to third from second in the production of industrial sand and gravel; sixth from fifth in lime; and seventh from sixth in kaolin. Texas ranked 13th in gemstone production (based on production value). Texas ranked fourth of six producing States in fire clay.

The following narrative information was provided by the Texas Bureau of Economic Geology[2] (TBEG). Production data in the following text are those reported by the TBEG, based upon its surveys and estimates. These data may differ from some USGS annual production figures, which were based upon USGS company surveys and estimates.

Industry Overview

In 2009, industrial minerals production significantly decreased, particularly in the aggregate and cement industries, owing to the economic downturn. Industry associations and aggregate producers indicated that sales decreased by 30% to 35% as compared to those of 2008. Producers in the Houston area saw an increase in activity as compared to other major markets in Texas; however, Federal highway stimulus funds made little impact in the Houston aggregate industry.

Employment

The Texas Workforce Commission reported a 17% decrease in job growth in the mining industry and a 14% decrease in the construction industry during 2009. The mining industry percentage included mining and mining support services (Brent A. Elliot, Research Associate, Bureau of Economic Geology, written commun., November 2012).

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at http://minerals.usgs.gov/minerals.

[2]Brent A. Elliot, Economic Geologist, Texas Bureau of Economic Geology of the John A. and Katherine G. Jackson School of Geosciences, University of Texas at Austin, authored the text of the State mineral industry information provided by the TBEG.

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Commodity Review

Industrial Minerals

Cement production and sales decreased by an estimated 20%. Frac sand production continued to increase, owing to the development of shale gas plays. Several frac sand facilities increased capacity and Cadre Proppants announced plans for a new frac sand site in Voca, McCulloch County, approximately 110 kilometers northwest of Austin (Cadre Proppants, 2009). Houston-based Natural Resource Partners L.P. acquired limestone reserves in Wise County from Blue Star Materials, LLC. Natural Resource was developing the properties and expected production to start in mid-2010 (Natural Resource Partners L.P., 2010).

Legislation and Government Programs

Texas continued to be an active participant in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grants program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. In 2009, the TBEG, as part of the STATEMAP program, completed geologic maps for the Blaton, Brazos Point, Hillsboro West, Keene, Lakeside Village, and Morgan quadrangles.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN TEXAS[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	368	52,100 e	274	40,300 e	202	28,300 e
Portland	10,900	1,060,000 e	11,100	1,110,000 e	8,350	815,000 e
Clays:						
Bentonite	64	3,730	73	12,000	54	8,610
Common	1,950	12,600	2,070	13,700	1,800	13,000
Gemstones, natural	NA	202	NA	202	NA	202
Gypsum, crude	2,520 r	15,300 r	1,870 r	13,900 r	1,310	9,330
Lime	1,620	132,000	1,500	128,000	1,040	105,000
Salt	8,950	143,000	9,080	157,000	8,910	164,000
Sand and gravel:						
Construction	96,100 r	656,000 r	88,300 r	631,000 r	70,000	528,000
Industrial	3,280	123,000	3,590 r	139,000	2,130	84,400
Stone:						
Crushed	153,000	1,020,000	150,000 r	1,100,000 r	110,000	782,000
Dimension	243	31,600	269	27,700	236	42,000
Combined values of brucite (2007–08), clays [ball, fire (2009), fuller's earth, kaolin], helium, talc (crude), zeolites	XX	72,100	XX	77,700	XX	69,700
Total	XX	3,320,000 r	XX	3,450,000 r	XX	2,650,000

eEstimated. rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
TEXAS: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	205 r	138,000 r	$1,000,000 r	184	99,700	$708,000
Marble	4	208	4,500	15	86	4,180
Sandstone and quartzite	6	1,360	11,400	8	2,480	9,870
Miscellaneous stone	46 r	9,950 r	81,700 r	45	7,940	59,200
Total	XX	150,000 r	1,100,000 r	XX	110,000	782,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	610	5,680
Filter stone	448	4,060
Other coarse aggregate	2,210	19,800
Coarse aggregate, graded:		
Concrete aggregate, coarse	3,350	25,500
Bituminous aggregate, coarse	1,070	11,800
Bituminous surface-treatment aggregate	150	1,200
Railroad ballast	1,030	10,900
Other graded coarse aggregate	9,750	106,000
Fine aggregate (-⅜ inch):		
Stone sand, concrete	818	7,540
Stone sand, bituminous mix or seal	247	2,680
Screening, undesignated	570	2,360
Other fine aggregate	2,710	20,000
Coarse and fine aggregate:		
Graded road base or subbase	7,880	35,600
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	1,870	5,090
Other coarse and fine aggregates	9,950	69,300
Other construction materials	1630	5,130
Agricultural, limestone	W	W
Chemical and metallurgical:		
Cement manufacture	12,600	54,800
Lime manufacture	W	W
Special, other fillers or extenders	W	W
Other miscellaneous uses and other specified uses not listed	1	15
Unspecified:[2]		
Reported	18,500	144,000
Estimated	33,700	241,000
Total	110,000	782,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W	W	W
Coarse aggregate, graded[3]	379	5,000	--	--	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	--	--	106	1,040	W	W
Coarse and fine aggregates[5]	312	1,900	W	W	W	W	W	W
Other construction materials	--	--	--	--	--	--	1,630	4,480
Agricultural[6]	W	W	--	--	--	--	--	--
Chemical and metallurgical[7]	W	W	--	--	W	W	--	--
Special[8]	--	--	--	--	--	--	W	W
Other miscellaneous uses	--	--	--	--	--	--	1	15
Unspecified:[9]								
Reported	--	--	--	--	--	--	--	--
Estimated	1,140	9,350	99	655	5,230	38,500	2,910	21,700
Total	1,880	16,500	391	1,990	6,650	49,300	7,120	47,200

	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	1,620	14,700	W	W	1,400	12,300	W	W
Coarse aggregate, graded[3]	2,270	17,300	--	--	9,860	89,400	W	W
Fine aggregate (-⅜ inch)[4]	1,080	4,570	--	--	2,650	21,600	W	W
Coarse and fine aggregates[5]	2,230	12,400	W	W	12,800	59,100	W	W
Other construction materials	2	147	--	--	3	500	--	--
Agricultural[6]	W	W	--	--	W	W	--	--
Chemical and metallurgical[7]	W	W	--	--	7,940	32,800	W	W
Special[8]	--	--	--	--	W	W	W	W
Other miscellaneous uses	--	--	--	--	--	--	--	--
Unspecified:[9]								
Reported	8,990	70,100	--	--	8,350	64,900	674	5,300
Estimated	10,200	74,100	643	5,410	12,200	83,200	--	--
Total	30,800	214,000	835	7,310	55,600	366,000	2,630	43,800

	District 9		Unspecified districts	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1½ inch)[2]	--	--	--	--
Coarse aggregate, graded[3]	W	W	7	154
Fine aggregate (-⅜ inch)[4]	W	W	--	--
Coarse and fine aggregates[5]	W	W	361	5,180
Other construction materials	--	--	--	--
Agricultural[6]	--	--	--	--
Chemical and metallurgical[7]	--	--	--	--
Special[8]	--	--	--	--
Other miscellaneous uses	--	--	--	--
Unspecified:[9]				
Reported	467	3,670	--	--
Estimated	1,330	8,450	--	--
Total	3,980	31,000	368	5,330

See footnotes at end of table.

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TABLE 4—Continued
TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone, riprap and jetty stone, and other coarse aggregate.
[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.
[5]Includes crusher run or fill or waste, graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes agricultural limestone.
[7]Includes cement and lime manufacture.
[8]Includes other fillers or extenders.
[9]Reported and estimated production without a breakdown by end use.

TABLE 5
TEXAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	14,400	$114,000	$7.95
Plaster and gunite sands	691	7,330	10.61
Concrete products (blocks, bricks, pipe, decorative, etc.)	90	1,030	11.42
Asphaltic concrete aggregates and other bituminous mixtures	908	10,600	11.70
Road base and coverings[2]	4,070	23,000	5.65
Fill	2,810	12,100	4.32
Other miscellaneous uses[3]	371	2,790	7.51
Unspecified:[4]			
Reported	9,090	77,200	8.50
Estimated	37,600	279,000	7.44
Total or average	70,000	528,000	7.54

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (cement and lime).
[3]Includes filtration, golf course, railroad ballast, and snow and ice control.
[4]Reported and estimated production without a breakdown by end use.

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TABLE 6

TEXAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	W	W	477	3,550
Asphaltic concrete aggregates and road base materials[3]	223	3,120	W	W	W	W
Fill	W	W	23	71	W	W
Other miscellaneous uses[4]	518	5,920	1,580	11,300	24	98
Unspecified:[5]						
Reported	63	532	17	134	154	1,360
Estimated	4,790	35,100	1,210	8,840	3,020	22,100
Total	5,590	44,700	2,820	20,300	3,670	27,100
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	67	519	2,810	22,200	W	W
Asphaltic concrete aggregates and road base materials[3]	52	255	291	1,860	W	W
Fill	-6	2	1,890	8,410	13	56
Other miscellaneous uses[4]	--	--	--	--	4,160	26,800
Unspecified:[5]						
Reported	31	226	2,420	17,600	5	15
Estimated	1,580	11,900	9,280	68,200	1,540	11,300
Total	1,730	12,900	16,700	118,000	5,720	38,100
	District 7		District 8		District 9	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	1,650	13,900	4,930	36,300	1,750	16,600
Asphaltic concrete aggregates and road base materials[3]	460	2,880	W	W	385	4,490
Fill	206	949	587	2,110	22	89
Other miscellaneous uses[4]	161	1,430	722	4,360	--	--
Unspecified:[5]						
Reported	2,270	16,500	3,870	38,700	262	2,190
Estimated	4,240	30,000	8,620	65,300	3,320	26,700
Total	8,980	65,600	18,700	147,000	5,730	50,100
	Unspecified districts					
	Quantity	Value				
Concrete aggregate and concrete products[2]	306	3,440				
Asphaltic concrete aggregates and road base materials[3]	49	705				
Fill	--	--				
Other miscellaneous uses[4]	--	--				
Unspecified:[5]	--	--				
Reported	--	--				
Estimated	--	--				
Total	355	4,150				

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration, golf course, railroad ballast, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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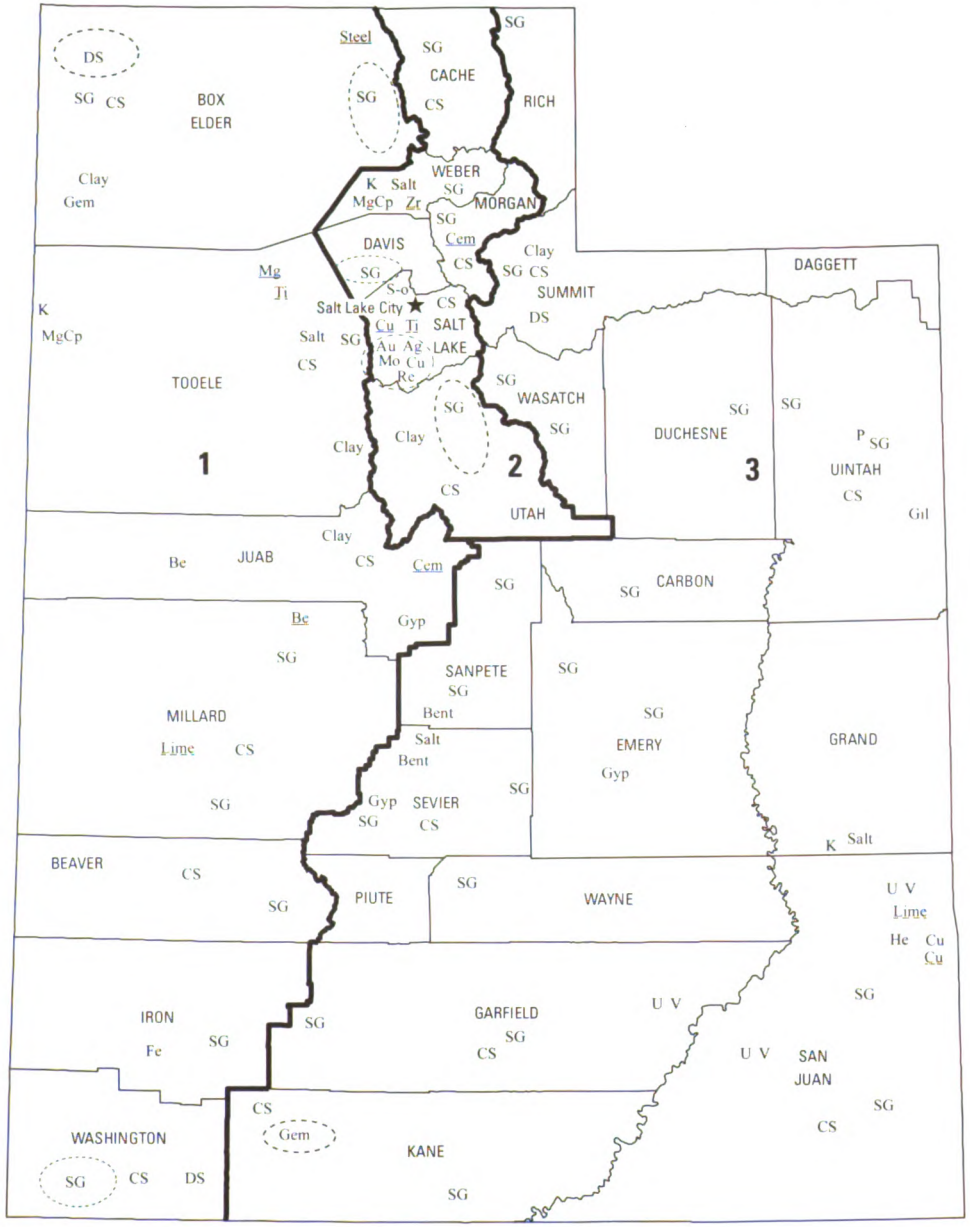
UTAH



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Ag	Silver
Au	Gold
Be	Beryllium
Be	Beryllium plant
Bent	Bentonite
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
DS	Dimension stone
Fe	Iron
Gem	Gemstones
Gil	Gilsonite
Gyp	Gypsum
He	Helium
K	Potash
Lime	Lime plant
Mg	Magnesium metal plant
MgCp	Magnesium compounds
Mo	Molybdenum
P	Phosphate rock
Re	Rhenium
Salt	Salt
SG	Construction sand and gravel
S-o	Sulfur (oil)
Steel	Steel plant
Ti	Titanium metal plant
U	Uranium
V	Vanadium
Zr	Zirconium metal plant
⬭	Concentration of mineral operations

0 50 100 Kilometers

Albers equal area projection

Source: Utah Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF UTAH

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Utah Geological Survey for collecting information on all nonfuel minerals.

In 2009, Utah's nonfuel raw mineral production was valued[1] at $3.9 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $270 million, or 6.4%, decrease from the State's total nonfuel mineral production value of almost $4.2 billion in 2008, which followed an approximately $290 million, or 7.4%, increase from a total production value of almost $3.9 billion in 2007. The State remained fourth in rank among the 50 States in total nonfuel mineral production value for the fourth consecutive year and accounted for 6.6% of the U.S. total value.

Metallic minerals (beryllium, copper, gold, magnesium, molybdenum concentrates, and silver) accounted for 80% of Utah's nonfuel mineral production value. The State's total nonfuel mineral production value declined owing to the decrease in the production values (in descending order of decrease) of magnesium metal, potash, copper, phosphate rock, and molybdenum concentrates, for a combined decrease of $410 million (actual data withheld—company proprietary data).

Gold was the leading mineral commodity produced in the State in production value, up by 74%, and up by 56% in production quantity (actual data withheld—company proprietary data). Significant increases also took place in the production value of silver, up by 40% (actual data withheld—company proprietary data), and salt up by $13 million, or 9%, despite a 7% decrease in production quantity (table 1).

The largest decrease in production value occurred in magnesium metal whose production decreased slightly, with a significant decrease in unit value. A 46% decrease in the quantity of crushed stone produced, from almost 9 million metric tons (Mt) to almost 5 Mt, resulted in a $33 million, or a 46%, decrease in the commodity's production value. Moderate decreases (in descending order of value) in the production of portland cement, construction sand and gravel, down by 15%, and lime, resulted in a combined value decrease of $88 million (actual data withheld—company proprietary data). The quantity of beryllium concentrates produced decreased by 31%.

In 2009, Utah continued to be the only State to produce beryllium concentrates and magnesium metal. The State remained ranked second in the production quantity of copper, magnesium compounds, and potash. Utah remained third in gold and fourth in silver among 11 gold- and silver-producing States. Utah rose in rank in the production quantity of construction sand and gravel, to fifth from sixth, and in the production quantity of salt, to sixth from seventh. The State rose in rank to third from fourth in gemstones (based on production value). The State decreased in rank to 3d from 2d in the production quantity of bentonite clay and molybdenum and to 12th from 10th in the production quantity of lime.

The Utah Geological Survey[2] (UGS) provided the following narrative information. UGS production data were based upon its surveys, estimates, and information gathered from company annual reports and may differ from some USGS annual production figures, which were based upon USGS company surveys and estimates.

Overview

In 2009, there was considerable uranium exploration, and several uranium mines and a uranium mill reopened; all of this activity was tempered by continued low uranium prices. One new uranium mine commenced production in late 2009. The startup of Allegheny Technologies, Inc.'s (Pittsburgh, PA) titanium sponge plant in December, adjacent to US Magnesium, LLC's (Salt Lake City, UT) magnesium facility on the west shore of the Great Salt Lake, was expected to increase demand for magnesium and begin a new era in metal processing in the State (Allegheny Technologies, Inc., 2010, p. 19). Utah's lone iron ore mine remained idle and no announcement was made as to when operations might resume. One new copper mine began production in 2009, but encountered problems with its mill that resulted in only a small amount of concentrates being produced.

Exploration and Development Activities

During 2009, the Utah Division of Oil, Gas, and Mining (DOGM) received 4 new large mine permit applications (2 hectares (ha) or larger of disturbance) and 15 new small mine permit applications (less than 2 ha of disturbance). This is an increase of one large mine permit application and a decrease of 18 small mine permit applications compared with those of 2008. In 2009, the DOGM listed 114 active large mines, an increase of 2 mines since 2008, and 195 active small mines, excluding construction sand and gravel operations, a decrease of 11 mines since 2008.

All of the new large mine applications were for industrial-mineral operations. New small mine applications included eight for industrial minerals, five for precious metals, one for base metals, and one for energy minerals. In 2009, 17 notices of intent to explore on public lands were filed with DOGM, compared with 64 in 2008 and 53 in 2007. The notices of intent included eight for energy minerals (all uranium), six for combinations of base and precious metals, one for base metals, one for precious metals, and one for gemstones, fossils, and other.

---

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]Kenneth Krahulec, Geologist, and Roger Bon, Industry Outreach Specialist, of the Utah Geological Survey authored the text of the State mineral industry information provided by that State agency.

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Slightly more than 1,400 (down from 6,000 in 2008) new Federal unpatented mining claims were recorded by the Bureau of Land Management (BLM), and the Utah School and Institutional Trust Lands Administration reported signing mineral lease contracts on 61 tracts of land in 2009 as compared with 196 tracts in 2008. The leases and tracts were divided among the following commodities: 32 metalliferous minerals, 2 gemstone/fossil, 15 potash, 5 sand and gravel, 2 volcanic material, 2 geothermal, 1 humic shale, 1 limestone, and 1 unclassified. The number of new unpatented mining claims filed in Utah rose dramatically from a low of 508 in 2001 to over 7,900 in 2007. Just over 1,400 new claims were staked in Utah during 2009 in Uintah County for phosphate, Beaver County for copper, Tooele County for copper and gold, and San Juan County for uranium. At the end of 2009, the BLM had over 21,000 unpatented mining claims filed in Utah. Mineral exploration and development work continued at a somewhat slower pace in 2009 than in 2008. Most of the exploration efforts were focused on copper, gold, molybdenum, potash, and uranium.

Industrial Minerals

In 2009, industrial minerals exploration activity increased in Utah. Simplot Phosphates LLC staked over 200 new claims in Uintah County for phosphate. Several companies had acquired parcels totaling over 50,000 ha (500 square kilometers) of ground and were exploring for potash brines in the Paradox Basin of southeastern Utah. Mesa Exploration Corp. (formerly Mesa Uranium Corp.; Vancouver, British Columbia, Canada) announced that it acquired approximately 2,400 ha of property at their Green Energy lithium brine project, which is also in the Paradox Basin (Mesa Exploration Corp., 2009).

Metals

In 2009, the Bingham Canyon Mine continued to produce near-record profits, and a sediment-hosted copper solvent extraction/electrowinning (SX-EW) operation in Lisbon Valley began to operate at full capacity. Base-metal exploration in 2009 was dominated by major companies doing brownfield exploration in the Bingham and Tintic mining districts for polymetallic projects.

Despite strong precious-metal prices, exploration activity in Utah for gold and silver slowed, largely due to the inability of small exploration companies to raise funds during the economic recession in 2008 and 2009. Precious-metal exploration was largely focused in the eastern Basin and Range Province of western Utah. In 2009, Kennecott Utah Copper Co.'s (South Jordan, UT) Bingham Canyon Mine was the leading producer of copper and the second-leading producer of molybdenum in the United States. Kennecott Utah Copper Co. continued an aggressive development program with efforts concentrated on extending the mine life past 2020, potentially to 2032 (Rio Tinto plc, 2010, p. 40).

Brownfield exploration by Kennecott Utah Copper Co. in the Oquirrh Mountains in 2009 included the addition of 140 magnetotelluric and 192 gravity stations to the existing grids. In addition, six deep core holes were drilled, totaling almost 10,000 meters (m), principally east and west of the Bingham pit. Exploration in the Oquirrh Mountains outside of the Bingham area included geologic mapping, geochemical sampling, and collecting magnetotelluric data from an additional 245 stations (Russell Franklin, Exploration Manager, Kennecott Exploration Company, written commun., March 2010). The program resulted in the discovery of a new copper-molybdenum-gold porphyry system within 3 kilometers (km) of the Bingham Canyon Mine (Rio Tinto plc, 2010, p.40).

Following bankruptcy, Lisbon Valley Mining Co. LLC (Moab, UT) successfully restarted mining in 2009 (Lisbon Valley Mining Co., 2013). Andover Mining Corp. (formerly Andover Ventures, Inc., Vancouver, British Columbia, Canada) and Genco Resources Ltd. (Vancouver, British Columbia, Canada) drilled the Burgin Extension deposit to complete a Canadian National Instrument (NI) 43–101 report on the historical resource of 1 Mt containing 565 ppm gold, 21% lead, and 6.7% zinc (Andover Mining Corp., 2011, p. 4). In 2009, Freeport-McMoRan Copper and Gold, Inc. (Phoenix, AZ) began an integrated program of geologic mapping, geochemical sampling, and geophysical surveying with Quaterra Resources Inc. (Vancouver, British Columbia, Canada) that identified targets to be drill tested in 2010 covering 1,300 ha of patented and unpatented mining claims covering the Southwest Tintic porphyry copper system in Juab County (Quaterra Resources Inc., 2009).

CML Metals Corp. (St. George, UT; formerly Palladon Iron Corporation, formerly a wholly owned subsidiary of Palladon Ventures Ltd.) owned the Iron Mountain property (formerly Comstock-Mountain Lion open pit). The ore occurs as a massive magnetite replacement/skarn deposit adjacent to Miocene laccoliths west of Cedar City. In 2009, CML Metals Corp. completed a Canadian N 43–101-compliant resource estimate on the Comstock-Mountain Lion deposit showing a resource of 28.5 Mt averaging 49% iron (Palladon Ventures, 2009). Stockpiled ore remained at the newly completed rail loadout near the mine, while the company reevaluated its production plans.

Cordex Exploration Co. (Reno, NV) acquired the 2,020-ha Silver Dome property in the southern Fish Springs district for Columbus Exploration Corp. (Vancouver, British Columbia, Canada; formerly Columbus Silver Corp). Silver mineralization at Silver Dome is hosted in flat-lying Ordovician sandstones. The target at Silver Dome was bulk-minable silver mineralization amenable to open-pit development. Columbus Exploration Corp. completed 13 reverse-circulation holes totaling 1,640 m in a Phase I drilling program. Weak gold mineralization was intersected, but no ore-grade intervals were cut (Columbus Exploration Corp., 2009).

Commodity Review

Industrial Minerals

Industrial mineral values have increased substantially over the past 10 years. Commodities or commodity groups that have realized the majority of these gains include construction sand and gravel, and crushed stone; portland cement; lime;

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salines including salt, magnesium chloride, and potash [potassium chloride and sulfate of potash (SOP)]; and phosphate rock. These commodities account for about 90% of the total value of Utah's industrial-minerals production. Other commodities produced in Utah, in descending order of value, include gilsonite; bentonite, common clay, and kaolin; expanded shale; and gypsum. The overall value of industrial minerals decreased owing to lower demand; however, several producers had near-record prices for their products, especially brine-derived products.

Cement.—Portland cement and lime were the third-largest contributors to the value of industrial minerals produced in 2009. Two operators produced portland cement in Utah: Holcim, Inc. (Bethlehem, PA) and Ash Grove Cement Co. (Overland Park, KS). Holcim's Devils Slide plant and mine were located east of Morgan in Morgan County, and Ash Grove's Leamington plant and mine were east of Lynndyl in Juab County. The companies had a combined capacity of more than 1.4 Mt of cement annually. Both plants operated below capacity in 2009. In addition to limestone, Ash Grove Cement mined a modest amount of shale and sandstone that were used in the manufacture of cement.

Clays.—Five companies produced approximately 200,000 metric tons (t) of common clay, bentonite, and high-alumina clay in 2009, approximately 64,000 t (24%) less than in 2008. Statewide, there were 18 active mine permits held by common clay, bentonite, and high-alumina clay operators in 2009. Many of these mines operated intermittently. The two leading producers of common clay in 2009 were Western Clay Co. (Aurora, UT) (bentonite) and Interstate Brick Co. (West Jordan, UT) (common clay). In addition, Interpace Industries, Inc. (Harrisville, UT) produced common clay, Redmond Minerals, Inc. produced bentonite, and an individually owned company mined lesser amounts of high-alumina clay. More than 75% of all common clay was used in the manufacture of brick. Bentonite was used as a sealant in many civil engineering applications, as a pet-waste absorbent (litter-box filler), as a component of oil and gas drilling fluids, and as a binder in foundry molds. High-alumina clays were used only in the manufacture of portland cement.

Gilsonite.—Gilsonite production for 2009 was estimated to be about 58,000 t, a decrease of about 11,000 t from that of 2008. Gilsonite is an unusual solid hydrocarbon that has been mined in Utah for more than 100 years. Gilsonite was marketed worldwide for use in over 150 products ranging from printing inks to explosives. All of the gilsonite mines are located in southeastern Uintah County. The three companies that produced gilsonite were, in descending order of production, American Gilsonite Co. (Bonaza, UT); Lexco, Inc. (the mine was purchased in mid-2009 by American Gilsonite); and Ziegler Chemical and Minerals Co. (Piscataway, NJ). Although lower in 2009, gilsonite production had been increasing modestly during the past several years prior to 2009.

Gypsum.—Three operators (down from seven in 2008) reported production of 140,000 t of gypsum in 2009, about 132,000 t, or 49%, less than in 2008. In descending order of production, the three producers were U.S. Gypsum Corp., Sunroc Corp. (St. George, UT; a subsidiary of Clyde Co., Inc.), and Diamond K Gypsum, Inc. (Richfield, UT). Georgia-Pacific Gypsum LLC (Atlanta, GA) and U.S. Gypsum operated the two wallboard plants in Utah; both plants are near the town of Sigurd in Sevier County. The Georgia Pacific plant remained closed during 2009. Most gypsum produced in Utah is used for making wallboard, but several operators supply raw gypsum to regional cement companies where it is used as an additive to retard the setting time of cement and to the agricultural industry for use as a soil conditioner. The decreased production of gypsum is directly related to the downturn of the housing industry in the Rocky Mountain region. Statewide, nine operations were active and eight were inactive.

Lime.—Lime production was about 33% lower in 2009 than in 2008. Graymont Western U.S., Inc. (Richmond, British Columbia, Canada), which produced dolomitic quicklime and high-calcium quicklime, was the only active producer in the State. Graymont Western's plant is in the Cricket Mountains, approximately 56 km southwest of Delta in Millard County, and is one of the 10 largest lime plants in the United States. Lhoist North America's (Fort Worth, TX; formerly Chemical Lime) plant near Grantsville in Tooele County was idle during 2009. Statewide, the DOGM listed 36 active limestone operations, including 15 large mine and 21 small mine permits. Total limestone production reported in 2009 was 4 Mt. Most limestone was used in the manufacture of cement and lime products. Other uses of limestone included construction as well as flue-gas desulfurization in coal-fired power plants. A small amount of limestone was also pulverized and marketed as "rock dust" to the coal mining industry.

Phosphate Rock.—Simplot Phosphates, LLC is Utah's only phosphate producer. The company's phosphate operation was 18 km north of Vernal in Uintah County. The mine produces roughly 2.7 to 3.6 Mt of ore annually, which is processed into 0.9 to 1.8 Mt of phosphate concentrate. The concentrate is transported in slurry form to the company's fertilizer plant in Rock Springs, WY, by a 145- km underground pipeline. During 2009, the mine produced about 3.4 Mt of ore, nearly the same as in 2008.

Salt, Magnesium Chloride, Potash (Potassium Chloride), and Sulfate of Potash.—Brine-derived products, including salt, were the largest contributors to the value of industrial-mineral production in Utah in 2009, with a combined value of $445 million, about $69 million (18%) more than in 2008. In addition to salt, brine-derived products include magnesium chloride and potash (potassium chloride and potassium sulfate). One company (North Shore Limited Partnership) produced a small amount of concentrated magnesium brine that was used as an ingredient in mineral food supplements. The statewide production of salt and other brine-derived products, excluding magnesium metal, was estimated to be 3.95 Mt in 2009, about 0.27 Mt more than in 2008. Potash production (including SOP) was estimated to be about 0.33 Mt in 2009, approximately 0.06 Mt less than in 2008. Salt production was estimated to be 3.0 Mt in 2009, about 0.18 Mt more than in 2008, with most of the production coming from three operators processing brine from the Great Salt Lake. The three largest operators were, in descending order of production, Great Salt Lake Minerals Corp. (a subsidiary of Compass Minerals International, Inc.),

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Cargill Salt Co. (Minneapolis, MN), and Morton International. In addition, three other companies produced salt and/or potash from operations not located on the Great Salt Lake: Intrepid Potash-Wendover, LLC near Wendover in Tooele County produced salt and potash; Intrepid Potash-Moab, LLC near Moab in Grand County produced salt and potash; and Redmond Minerals, Inc. near Redmond in Sanpete County produced rock salt.

Sand and Gravel, Construction, and Stone, Crushed.—Construction sand and gravel and crushed stone were the second-largest contributors to the value of industrial minerals produced in Utah during 2009, with an estimated value of $214 million, about $26 million (11%) lower than in 2008. These materials were produced in nearly every county in Utah by commercial operators as well as county, State, and Federal agencies. Owing to the large number of operations (approximately 140 active pits and quarries), the UGS does not send production questionnaires to this group.

Shale, Expanded.—Expanded or "bloated" shale (a lightweight aggregate used mainly in the construction industry) is manufactured by roasting high-purity shale at temperatures near 1,100 °C. The intense heat causes the shale to expand and vitrify, creating a lightweight aggregate that is durable, uniform in size, and inert. Utelite Corp. is the sole producer of this type of aggregate in the State. The mine and plant are located east of Wanship in Summit County.

Metals

Beryllium.—Utah continued to be the Nation's sole producer of beryllium concentrates. Brush Resources operated a beryllium (bertrandite) mine in Juab County, and domestic ore and imported beryl can be processed through parallel circuits at the company's plant a few miles north of Delta in Millard County. After processing, beryllium hydroxide was then sent to the company-owned refinery and finishing plant in Elmore, OH, where it is converted into beryllium metal, alloys, and oxide. In 2005, Brush Resource's parent company, Brush Engineered Materials, Inc., was awarded a contract under the Department of Defense's Defense Production Act, Title III Program for the engineering and design of a new facility for the production of primary beryllium, the feedstock material used to produce beryllium metal products. Construction of the new facility began in 2008 and was expected to be finished in 2010. The new facility is located at the existing plant site in Ohio.

Copper.—Copper was the largest contributor to the value of nonfuel minerals in Utah with an estimated value of $1.7 billion. Although the price decreased sharply in 2009, a substantial increase in production raised the value of copper produced to near the alltime high, and the value of base-metal production statewide to $2.13 billion. The Bingham Canyon Mine produced about 304,000 t of copper in 2009, compared with the 238,000 t produced in 2008 (Rio Tinto plc, 2010, p. 65).

Gold and Silver.—The Barney's Canyon Mine exhausted its reserves in late 2001 and ceased mining, but continued to produce gold from its heap-leach pads at a reduced rate in 2009, down from less than 160,000 kg (5 million troy ounces) to about 62,000 kg (2 million troy ounces) (Rio Tinto plc, 2010, p. 65). The leach pads were anticipated to be depleted in 2010. Silver was also a byproduct metal from the Bingham Canyon Mine. Silver production was approximately 152,000 kg (4.9 million troy ounces) in 2009, about 46,700 kg (1.5 million troy ounces), or 44%, more than a 106,000 kg (3.41 million troy ounces) in 2008 (Rio Tinto plc, 2010, p. 66). Several other small mines in the State likely produced minor amounts of gold and silver, but production was not reported nor included in the above totals.

Magnesium.—Magnesium metal was the third-largest contributor to the value of base metals in 2009. Magnesium metal was produced from Great Salt Lake brines by US Magnesium, LLC (Salt Lake City, UT) at its electrolytic plant at Rowley in Tooele County. The plant's annual capacity is 52,000 t of magnesium metal at 99.8% purity (Kramer, 2011, p. 45.1). It remained the only active primary magnesium processing facility in the Nation. Magnesium production in 2009 was moderately higher than in 2008.

Molybdenum.—Molybdenum was the second-largest contributor to the value of Utah's base-metal production in 2009. Kennecott's Bingham Canyon Mine produced about 11,300 t of byproduct molybdenum in 2009, compared to 10,700 t produced in 2008 (Rio Tinto plc, 2010, p. 66). The USGS reports that the Bingham Canyon Mine was one of five domestic copper mines to recover molybdenum as a byproduct (Polyak, 2011, p. 50.13).

Vanadium.—Vanadium is produced as a coproduct with uranium in several uranium mines in Utah and is recovered in the form of vanadium pentoxide (V_2O_5) during the milling of uranium ore. Three mines operated by Denison Mines produced vanadium-bearing ore in 2009, which was processed at the White Mesa Mill.

Mineral Fuels and Related Materials

Uranium.—Utah has historically been a significant uranium-producing State, with the majority of its production from the Colorado Plateau in the southeastern portion of the State. Uranium exploration and development activity in Utah has fluctuated along with the spot prices.

Denison Mines Corp. (Toronto, Ontario, Canada) owns five permitted uranium mines in Utah as well as the 1,800-metric-ton-per- day (t/d), dual-circuit (uranium-vanadium) White Mesa Mill near Blanding, San Juan County. The mill processes both uranium ore and an alternate feed waste material. The mill began operating on stockpiled ore from Denison-owned mines in 2008, and began accepting ore from other mining companies for toll milling in 2009. Uranium recoveries were averaging over 90%. The mill had the capacity to produce about 1,360 t of U_3O_8 and 2,000 t of V_2O_5 annually.

Denison's Pandora Mine in the eastern La Sal district of San Juan County, shipped about 270 t/d 110 km south to the White Mesa Mill. Reserves at the Pandora Mine were estimated to be 263,000 t at 0.22% U_3O_8 and 1.1% V_2O_5. In 2009, Denison reopened the Beaver Mine, 3 km west of the Pandora Mine. Beaver was producing about 200 t/d from a resource estimated at 680,000 t at 0.2% U_3O_8 and 1.25% V_2O_5. The La Sal district uranium ores are hosted in the Upper Jurassic Salt Wash Member of the Morrison Formation.

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Denison's Henry Mountains Complex (Tony M Mine and Bullfrog properties), in the Shootaring Canyon district of Garfield County, hosts the largest known uranium resource in Utah, estimated to be about 1.5 Mt averaging 0.24% U_3O_8. Declining uranium prices and lower than anticipated head grades forced its closure in November 2008, and approximately 18,000 t of ore remained stockpiled at the Henry Mountains Complex. The mine had a 200-km haul route to the White Mesa mill.

Denison's Rim Mine in the Dry Valley (East Canyon) district of San Juan County began operating at 45 t/d, with reserves estimated at 136,000 t at 0.22% U_3O_8 and 2% V_2O_5. Rim's status was changed to standby in March 2009. Both the Shootaring and Dry Valley district uranium ore bodies are hosted in the Upper Jurassic Salt Wash Member of the Morrison Formation.

White Canyon Uranium Ltd. (Vancouver, British Columbia, Canada) obtained the necessary permits for the Daneros Mine in the White Canyon district in San Juan County in May 2009, development began in July, and mining began in December 2009. The Daneros ore body had an estimated resource of 190,000 t at 0.3% U_3O_8. Ore was shipped 100 km to the White Mesa mill for toll milling. The White Canyon district ores are hosted by the basal Shinarump Conglomerate Member of the Upper Triassic Chinle Formation and typically contain about 1% copper.

Energy Fuels, Inc. (Toronto, Ontario, Canada) explored and rehabilitated its historical uranium mines. The Whirlwind Mine on Beaver Mesa straddles the Utah-Colorado border about 45 km northeast of Moab in Grand County. The property began limited production in 2009. The Whirlwind resource is about 149,000 t averaging 0.20% U_3O_8 and 0.66% V_2O_5. Energy Fuels began rehabilitation of their 284-ha Hecla Shaft Mine near La Sal, San Juan County. The mine, renamed the Energy Queen, had an estimated resource of 234,000 t averaging 0.24% U_3O_8 and 0.96% V_2O_5, with access via an existing 229-m-deep lined shaft. Both the Whirlwind and Energy Queen uranium ores are hosted in the Upper Jurassic Salt Wash Member of the Morrison Formation.

Environmental Issues and Other Activities

The U.S. Department of Energy (DOE) and the State of Utah have agreed to move the 10.8 Mt of uranium mill tailings located along the Colorado River near Moab. The tailings, sitting on a 52-ha site, formerly owned by Atlas Minerals Corp., are estimated to average about 100 ppm uranium and 400 ppm vanadium [Don Metzler, Federal Project Director for Moab UMTRA (Uranium Mill Tailings Remedial Action) program, U.S. Department of Energy, oral commun., March 2007.] The tailings were to be moved 48 km north to a site near Crescent Junction. DOE will transport the tailings by rail to a 100-ha disposal cell developed in the Cretaceous Mancos Shale. The $1 billion reclamation project began shipping tailings in April 2009, and over $100 million was spent on the effort in 2009. The completion of the reclamation project was expected in 2028.

New minerals-related publications by the UGS include: Utah Renewable Energy Zones Task Force Phase I Report titled Renewable Energy Zone Resource Identification (Berry and others, 2009); Annotated Bibliography of Utah Tar Sands and Related Information—2009 (Gwynn and Hanson, 2009); and Strategies for In Situ Recovery of Utah's Heavy Oil and Bitumen Resources (Schamel, 2009).

A new CD published in 2009 by the Utah Geological Association contains papers on mineral resources, water resources, geology, stratigraphy, and geophysics. The CD also includes papers on Bingham Canyon Mine expansion, geology of the Crypto zinc skarn, Iron Mountain iron resources, Kings Canyon gold mineralization, Keg Mountain exploration, Gold Mountain mining district, saline resources, and three historical mineral resource papers (Utah Geological Association, 2009).

Additional information can be obtained on the UGS Web site at http://geology.utah.gov/ and the UGS Map and Bookstore at http://mapstore.utah.gov/. Additional geographic information system (GIS) data on Utah is available for free download at http://agrc.its.state.ut.us/ and http://geology.utah.gov/databases/index.htm.

The UGS has been an active participant in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. Under the FEDMAP, the State had three mapping projects in progress. Utah completed 11 mapping projects under the STATEMAP and completed one mapping project under the EDMAP in 2009.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN UTAH[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral		2007 Quantity	2007 Value	2008 Quantity	2008 Value	2009 Quantity	2009 Value
Beryllium concentrates	metric tons	3,810	NA	4,410	NA	3,030	NA
Clays, Common		531	10,400	479	10,200	342	7,230
Gemstones, natural		NA	240	NA	781	NA	783
Salt		2,470	135,000	2,150	139,000	2,000	152,000
Sand and gravel, construction		45,700 r	265,000 r	38,900 r	222,000 r	32,400	190,000
Stone:							
Crushed		13,200	97,800	8,950 r	72,700 r	4,830	39,400
Dimension		8	619	9	707	9	844
Combined values of cement (portland), clays (bentonite), copper, gold, gypsum (crude), helium (Grade–A), lime, magnesium compounds, magnesium metal, molybdenum concentrates, phosphate rock, potash, silver		XX	3,370,000	XX	3,730,000	XX	3,510,000
Total		XX	3,880,000	XX	4,170,000 r	XX	3,900,000

rRevised. NA Not available. XX Not applicable.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
UTAH: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	15 r	7,100 r	$57,200 r	18	3,430	$29,700
Dolomite	-- r	-- r	-- r	--	--	--
Sandstone and quartzite	4 r	236	2,790 r	5	239	2,940
Volcanic cinder and scoria	-- r	-- r	-- r	--	--	--
Miscellaneous stone	12 r	1,620 r	12,700 r	12	1,160	6,770
Total	XX	8,950 r	72,700 r	XX	4,830	39,400

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
UTAH: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	W	W
Other coarse aggregate	W	W
Coarse aggregate, graded, railroad ballast	W	W
Coarse and fine aggregates, crusher run or fill or waste	W	W
Other construction materials	4	17
Agricultural, poultry grit and mineral food	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Flux stone	W	W
Unspecified:[2]		
Reported	2,020	14,100
Estimated	420	3,740
Total	4,830	39,400

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

TABLE 4
UTAH: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		Unspecified districts	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	--	--	W	W	--	--	--	--
Coarse aggregate, graded[3]	W	W	--	--	--	--	--	--
Coarse and fine aggregate[4]	--	--	W	W	--	--	--	--
Other construction materials	--	--	4	17	--	--	--	--
Agricultural[5]	--	--	W	W	--	0	--	--
Chemical and metallurgical[6]	W	W	W	W	--	--	--	--
Unspecified:[7]								
Reported	568	5,270	907	7,560	118	945	430	286
Estimated	44	355	281	2,610	96	776	--	--
Total	1,870	17,400	2,310	20,000	214	1,720	430	286

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes riprap and jetty stone and other coarse aggregate.
[3]Includes railroad ballast.
[4]Includes crusher run or fill or waste.
[5]Includes poultry grit and mineral food.
[6]Includes cement and lime manufacture, and flux stone.
[7]Reported and estimated production without a breakdown by end use.

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TABLE 5
UTAH: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	1,140	$8,650	$7.61
Asphaltic concrete aggregates and road base materials	3,940	22,700	5.77
Fill	2,410	12,100	5.03
Other miscellaneous uses[3]	100	762	7.62
Unspecified:[4]			
Reported	6,090	33,700	5.53
Estimated	18,700	112,000	5.99
Total or average	32,400	190,000	5.86

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes snow and ice control, and railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

TABLE 6
UTAH: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products[2]	W	W	665	4,330	W	W
Asphaltic concrete aggregates and road base materials	1100	6770	1,050	5,450	873	5,850
Fill	891	5,820	1,420	5,930	77	311
Other miscellaneous uses[3]	314	2,670	41	277	217	2,140
Unspecified:[4]						
Reported	1,610	9,070	3,190	18,600	952	5,260
Estimated	3,350	19,200	12,000	74,700	3,340	18,100
Total	7,260	43,500	18,400	109,000	5,460	31,700

	Unspecified districts	
	Quantity	Value
Concrete aggregate (including concrete sand)[2]	--	--
Asphaltic concrete aggregates and road base materials	924	4,660
Fill	22	43
Other miscellaneous uses[3]	--	--
Unspecified:[4]		
Reported	345	723
Estimated	--	--
Total	1,290	5,430

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes snow and ice control and railroad ballast.
[4]Reported and estimated production without a breakdown by end use.

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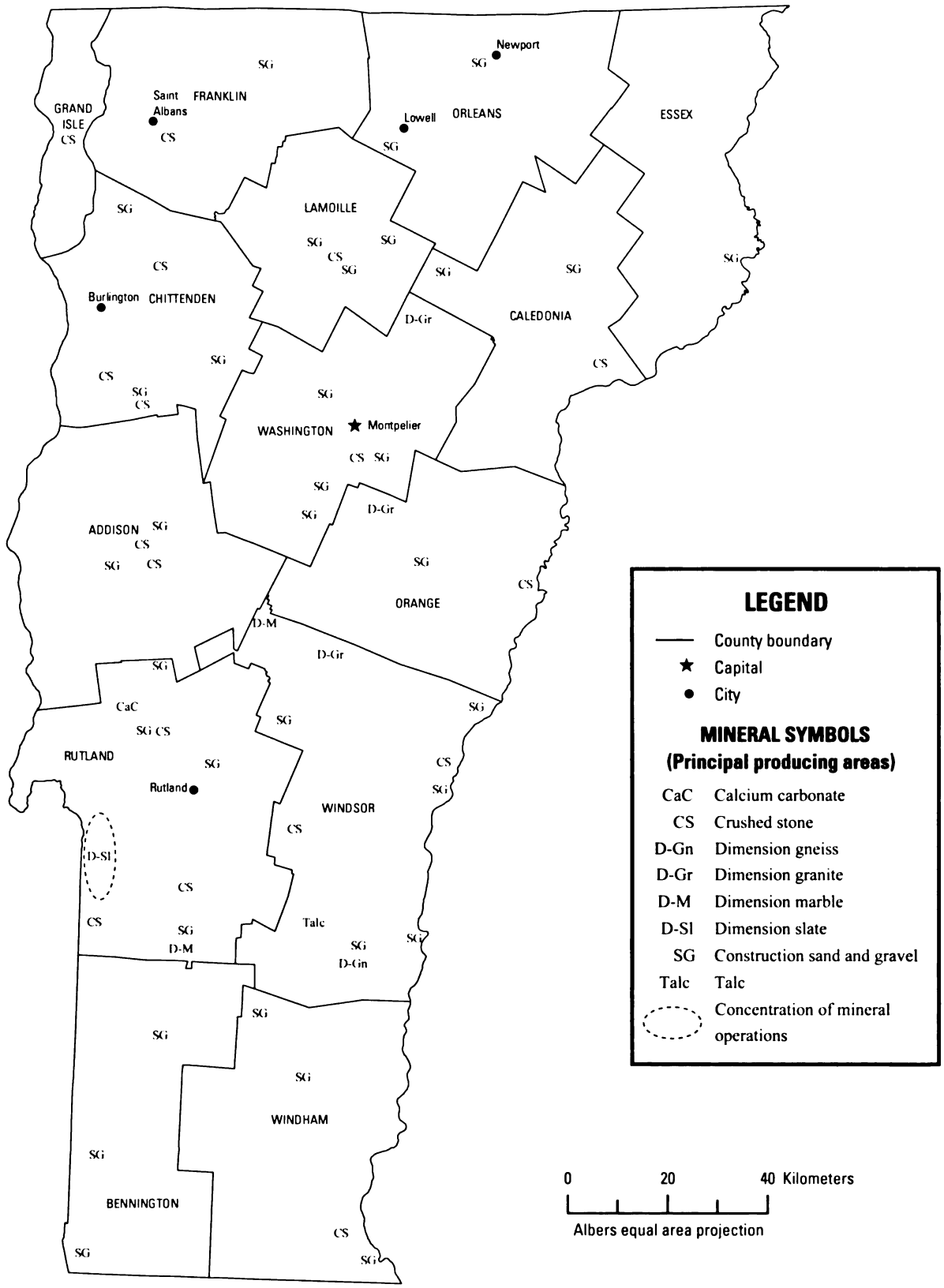
VERMONT



LEGEND

- County boundary
- Capital
- City

MINERAL SYMBOLS
(Principal producing areas)

CaC	Calcium carbonate
CS	Crushed stone
D-Gn	Dimension gneiss
D-Gr	Dimension granite
D-M	Dimension marble
D-Sl	Dimension slate
SG	Construction sand and gravel
Talc	Talc
	Concentration of mineral operations

Source: Vermont Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF VERMONT

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Vermont Geological Survey for collecting information on all nonfuel minerals.

In 2009, Vermont's nonfuel raw mineral production[1] was valued at $122 million, based upon annual U.S. Geological Survey (USGS) data. This represented a $5 million, or 4%, increase from the State's total nonfuel mineral value of $117 million for 2008 and 2007. Vermont increased in rank from 46th to 45th among the 50 States in total nonfuel mineral production value, accounting for less than one-quarter of 1% of the total U.S. nonfuel mineral production value.

In 2009, crushed stone, construction sand and gravel, and dimension stone, in descending order of value, were Vermont's leading nonfuel mineral commodities. Crushed stone and dimension stone accounted for 70% of the State's nonfuel mineral production, down slightly from 71% in 2008. Although production of crushed stone and construction sand and gravel declined by 260,000 metric tons and 490,000 metric tons from 2008 to 2009, both mineral commodities increased in production value by $7.5 and $3.1 million, respectively. The production of dimension stone was down 4,000 metric tons from 2008 to 2009, with a loss of $5.9 million in that mineral commodity's production value.

In 2009, Vermont continued to rank third in the quantity of crude talc produced among the three talc-producing States (actual values withheld—company proprietary data). The State rose in rank to fifth from sixth, though down from third in 2007, in the production of dimension stone, and rose to 39th in 2009 from 43d in 2008 in the production of crushed stone.

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN VERMONT[1, 2]

(Thousand metric tons and thousand dollars unless otherwise specified)

		2007		2008		2009	
Mineral		Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural		NA	1	NA	1	NA	1
Sand and gravel, construction		5,310 r	35,300 r	4,960 r	33,600 r	4,470	36,700
Stone:							
Crushed		6,460	46,200	5,690 r	47,500 r	5,430	54,900
Dimension		110	35,700	112	35,900	108	30,000
Talc, crude	metric tons	W	W	W	W	W	W
Total		XX	117,000 r	XX	117,000 r	XX	122,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; excluded from "Total." XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
VERMONT: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	10 r	1,970 r	$16,200 r	10	1,800	$17,700
Granite	-- r	-- r	-- r	--	--	--
Marble	-- r	-- r	-- r	--	--	--
Sandstone and quartzite	6	709	6,090	5	897	10,900
Slate	6 r	356 r	2,900 r	6	237	2,330
Miscellaneous stone	22 r	2,660 r	22,200 r	23	2,500	24,000
Total	XX	5,690 r	47,500 r	XX	5,430	54,900

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
VERMONT: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	32	378
Filter stone	37	397
Other coarse aggregate	17	149
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	93	1,220
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	W	W
Other fine aggregate	3	215
Coarse and fine aggregates:		
Graded road base or subbase	264	2,850
Unpaved road surfacing	192	1,990
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	207	1,460
Other construction materials	11	143
Agricultural, limestone	W	W
Other miscellaneous uses and specified uses not listed	9	103
Unspecified:[2]		
Reported	462	5,720
Estimated	3,610	33,400
Total	5,430	54,900

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
VERMONT: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	196	$2,040	$10.42
Asphaltic concrete aggregates and road base materials[3]	675	4,860	7.20
Fill	146	642	4.40
Other miscellaneous uses[4]	242	1,510	6.22
Unspecified:[5]			
Reported	341	2,780	8.14
Estimated	2,870	24,900	8.67
Total or average	4,470	36,700	8.21

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Includes road and other stabilization (lime).
[4]Includes filtration, snow and ice control, and railroad ballast.
[5]Reported and estimated production without a breakdown by end use.

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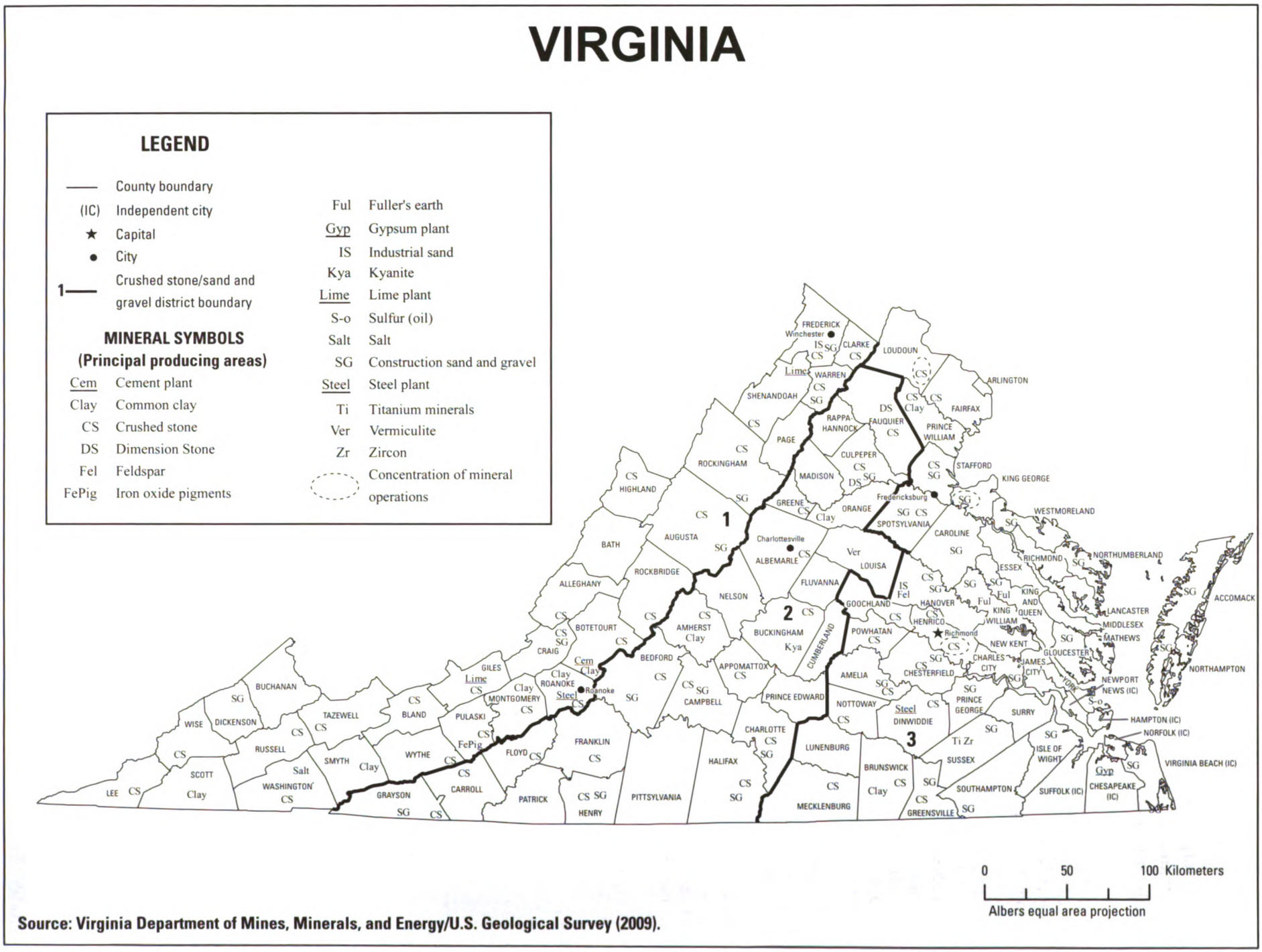
VIRGINIA



Source: Virginia Department of Mines, Minerals, and Energy/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF VIRGINIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Virginia Department of Mines, Minerals and Energy for collecting information on all nonfuel minerals.

In 2009, Virginia's nonfuel raw mineral production[1] was valued at $955 million, based upon annual U.S. Geological Survey (USGS) data. This was a decrease of $219 million, or nearly 19%, from the State's total nonfuel raw mineral production value of $1.17 billion in 2008, which had decreased $2 million, or less than 1%, from a total production value of almost $1.18 billion in 2007. Virginia rose in rank to 19th from 21st in 2008 among the 50 States in total nonfuel raw mineral production value and accounted for 1.6% of the U.S. total.

Crushed stone was, by value, Virginia's leading nonfuel mineral commodity, accounting for 60% of the State's total nonfuel mineral value in 2009 (table 1). From 1990 through 2009, the State produced nearly 1.22 billion metric tons of crushed stone, or an average of 63 million metric tons per year (Mt/yr) during that 19-year period. In 2009, Virginia produced 42.2 million metric tons (Mt) of crushed stone, with granite and limestone accounting for 32.7 Mt (table 2). Construction sand and gravel was the second leading nonfuel mineral commodity by production value, followed by portland cement, lime, and zirconium concentrates (data withheld for portland cement, lime, and zirconium concentrates—company proprietary data). These five mineral commodities represented 87% of the State's total nonfuel mineral value.

In 2009, salt was the only mineral commodity produced in Virginia to increase in production value (actual production value withheld—company proprietary data). All other commodities produced in the State declined in production value, led by decreases in crushed stone, which decreased by $135 million, portland cement and zirconium concentrates, and construction sand and gravel, down by $17 million. Decreases in the production values of ilmenite, lime, and fuller's earth clay (montmorillonite) (in descending order of decrease; production values withheld—company proprietary data) also accounted for significant portion of the total decrease in the State's total production value.

Salt was the only mineral commodity that increased in production quantity in 2009 (quantity withheld—company proprietary data). The quantity of all other commodities produced in the State decreased, led by a 15-Mt decrease in the quantity of crushed stone produced, followed by a 2.2-Mt decrease in construction sand and gravel. Other notable declines in production occurred with portland and masonry cement, down by an average of 22% from those of 2008; iron oxide pigments, down by 73%; and zirconium concentrates, down by 42%.

Virginia continued to be the only U.S. producer of kyanite and to rank first of two titanium mineral (ilmenite) producers. The State remained 2d in rank for feldspar and crude vermiculite among 7 and 2 producing States, respectively; 3d in rank for iron oxide pigments out of 3 States; and remained 4th for fuller's earth clays out of 11 montmorillonite-producing States. All other commodities produced in the State declined in rank, including from 1st to 2d in the production of zirconium concentrates among two producing States, from 7th to 9th in common clays out of 38 States, from 9th to 10th in masonry cement out of 26 States, and from 8th to 10th in crushed stone production among 50 producing States.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1

NONFUEL RAW MINERAL PRODUCTION IN VIRGINIA[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	725	7,840	766	8,540	505	5,830
Kyanite	118	29,100	97	25,500	71	20,000
Mica, crude	(3)	1	--	--	--	--
Sand and gravel, construction	12,400 r	116,000 r	10,400 r	111,000 r	8,180	93,100
Stone, crushed	62,600	713,000	57,400 r	712,000 r	42,200	577,000
Combined values of cement, clays (fuller's earth), feldspar, gemstones (natural), iron oxide pigments (crude), lime, salt, sand and gravel (industrial), stone (dimension), titanium concentrates (ilmenite), vermiculite (crude), zirconium concentrates	XX	310,000	XX	318,000 r	XX	260,000
Total	XX	1,180,000	XX	1,170,000 r	XX	955,000

rRevised. XX Not applicable. -- Zero.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

[3]Less than ½ unit.

TABLE 2

VIRGINIA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	45 r	19,800 r	$226,000 r	51	15,300	$189,000
Dolomite	3	1,900	17,600 r	--	--	--
Granite	32 r	22,800 r	309,000 r	30	17,400	258,000
Sandstone and quartzite	7 r	1,110 r	12,200 r	6	1,070	15,200
Traprock	10	10,100	130,000 r	10	7,130	99,400
Slate	3	454	2,850	2	202	1,230
Miscellaneous stone	4	1,280	14,700 r	6	1,050	14,200
Total	XX	57,400 r	712,000 r	XX	42,200	577,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
VIRGINIA: CRUSHED STONE SOLD OR USED BY
PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	149	1,060
Riprap and jetty stone	189	2,630
Filter stone	578	6,170
Other coarse aggregate	847	15,100
Coarse aggregate, graded:		
Concrete aggregate, coarse	766	9,370
Bituminous aggregate, coarse	982	13,300
Bituminous surface-treatment aggregate	208	3,000
Railroad ballast	730	8,550
Other graded coarse aggregate	6,050	96,900
Fine aggregate (-⅜ inch):		
Stone sand, concrete	508	6,120
Stone sand, bituminous mix or seal	236	2,940
Screening, undesignated	318	3,370
Other fine aggregate	1,570	18,800
Coarse and fine aggregates:		
Graded road base or subbase	865	9,530
Unpaved road surfacing	344	3,350
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	1,390	14,300
Roofing granules	W	W
Other coarse and fine aggregate	4,020	49,400
Other construction materials	114	1,040
Agricultural:		
Limestone	646	12,100
Other agricultural uses	123	5,490
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Glass manufacture	W	W
Special:		
Mine dusting or acid water treatment	W	W
Other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	3	64
Unspecified:[2]		
Reported	13,200	182,000
Estimated	7,390	94,700
Total	42,200	577,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	1,040	10,600	W	W	W	W
Coarse aggregate, graded[3]	2,260	25,000	W	W	W	W
Fine aggregate (-⅜ inch)[4]	1,400	16,400	W	W	W	W
Coarse and fine aggregate[5]	2,790	25,200	W	W	W	W
Other construction materials	89	652	25	390	--	--
Agricultural[6]	W	W	W	W	W	W
Chemical and metallurgical[7]	W	W	--	--	--	--
Special[8]	W	W	--	--	--	--
Other miscellaneous uses	3	64	--	--	--	--
Unspecified:[9]						
Reported	202	3,000	2,650	36,800	10,300	142,000
Estimated	5,740	73,600	1,640	21,100	--	--
Total	15,100	187,000	7,400	98,200	19,700	292,000

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregates.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate ballast, railroad (coarse), and other graded coarse aggregates.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, terrazzo and aggregate, exposed unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone and other agricultural uses.

[7]Includes chemical, lime, and glass manufacture.

[8]Includes mine dusting or acid water treatment and other fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

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TABLE 5
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate and concrete products[2]	2,420	$34,700	$14.32
Asphaltic concrete aggregates and other bituminous mixtures	223	1,590	7.13
Road base and coverings	25	195	7.80
Fill	926	4,370	4.72
Snow and ice control	7	52	7.43
Other miscellaneous uses	6	74	12.33
Unspecified:[3]			
Reported	1,470	16,600	11.26
Estimated	3,100	35,600	11.48
Total or average	8,180	93,100	11.38

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes plaster and gunite sands.
[3]Reported and estimated production without a breakdown by end use.

TABLE 6
VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products	W	W	W	W	2,340	33,700
Fill	[2]	1	[2]	1	926	4,360
Other miscellaneous uses[3]	100	1,140	41	444	201	1,320
Unspecified:[4]						
Reported	66	691	28	164	1,380	15,700
Estimated	732	8,430	1,060	12,100	1,310	15,000
Total	899	10,300	1,130	12,700	6,160	70,100

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Less than ½ unit.
[3]Includes asphaltic concrete aggregates, road base materials, and snow and ice control.
[4]Reported and estimated production without a breakdown by end use.

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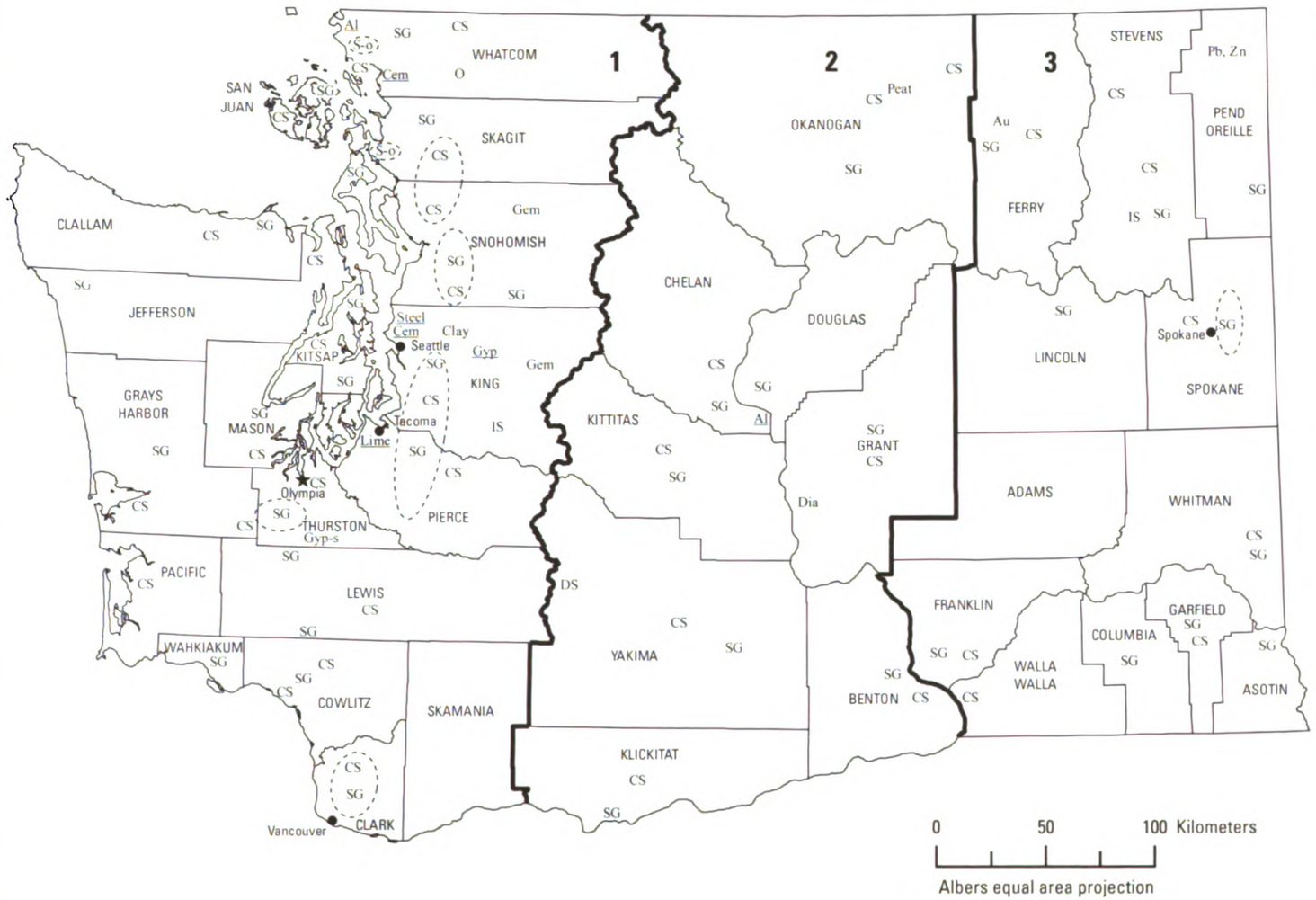
WASHINGTON



LEGEND

- County boundary
- ★ Capital
- ● City
- 1— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Al	Aluminum plant
Au	Gold
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Dia	Diatomite
DS	Dimension stone
Gem	Gemstones
Gyp	Gypsum plant
Gyp-s	Synthetic gypsum
IS	Industrial sand
Lime	Lime plant
O	Olivine
Pb	Lead
Peat	Peat
SG	Construction sand and gravel
S-o	Sulfur (oil)
Steel	Steel plant
Zn	Zinc

Concentration of mineral operations

Source: Washington State Division of Geology and Earth Resources/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF WASHINGTON

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Washington Department of Natural Resources, Division of Geology and Earth Resources, for collecting information on all nonfuel minerals.

In 2009, Washington's nonfuel raw mineral production[1] was valued at $650 million, based upon annual U.S. Geological Survey (USGS) data. This was a nearly 10% decrease, or $72 million, from the $722 million total value for 2008, which was down by 3.6%, or $27 million, from that of 2007, $749 million. In spite of the decreases in total value, the State remained 29th in rank among the 50 States in total nonfuel raw mineral production value, accounting for slightly more than 1% of the U.S. total nonfuel mineral production value in 2009.

In 2009, Washington's leading nonfuel mineral commodities by production value were, in descending order of value, construction sand and gravel, gold, crushed stone, portland cement, and lime. Construction sand and gravel and crushed stone accounted for almost 56% of the State's total nonfuel mineral value, down significantly from 68% in 2008, primarily due to the 9.7 million metric ton (Mt) decrease in construction sand and gravel production and the 2.8 Mt decrease in crushed stone production.

The largest increase in production value in the State in 2009 took place with gold. Gold production, which resumed in 2008 in the State, increased four-fold with a five-fold increase in production value (actual values for gold withheld—company proprietary data). The next largest increase, a 294% increase in the production value of diatomite, was still significantly smaller than the increase in the production value of gold. Other increases in production values took place with lime, peat, and gemstones (lime and peat values withheld—company proprietary data).

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

The largest decreases in production value took place in construction sand and gravel, zinc, crushed stone, portland cement, and lead. The production value of construction sand and gravel was down $96 million, or almost 30%, from $326 million in 2008 to $230 million in 2009. The production value of crushed stone was down $37 million, from $168 million in 2008 to $131 million in 2009. Both mineral commodities had slight increases in production values from 2007 to 2008, although production levels were down by 13% for construction sand and gravel and almost 3% for crushed stone over the same time period.

Washington had significant metal production in 2009, although two of the major metals produced in the State—lead and zinc—had sharp declines. Zinc production increased almost 22% from 2007 to 2008, but declined by 86% from 2008 to 2009. Zinc production values, however, declined almost 30% from 2007 to 2008 and continued to decline by a further 88% from 2008 to 2009. Lead, which had increased 21% in production and 18% in production value from 2007 to 2008, and accounted for the largest increase in production value among all mineral commodities produced in the State in 2008, decreased by almost 83% and 88% from 2008 to 2009, respectively.

In 2009, Washington continued to be first in the quantities of olivine produced of the two olivine-producing States and fifth of five lead-producing States. The State decreased to fourth from third in the production of zinc. After rising to fifth in 2008, the State decreased to eighth in the production of construction sand and gravel in 2009. Primary aluminum and raw steel also were produced in Washington, but both metals were processed from materials acquired from foreign and other domestic sources. In 2009, notwithstanding a 17% decrease in production and almost 46% decrease in production value, the State remained third in rank, based on production, of the 10 States that produced primary aluminum.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WASHINGTON[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	84	170	88	360	W	W
Gemstones, natural	NA	49	NA	50	NA	65
Peat	W	66	W	75	W	W
Sand and gravel, construction	45,700 r	325,000 r	39,600 r	326,000 r	29,900	230,000
Stone, crushed	18,000	166,000	17,500 r	168,000 r	14,700	131,000
Combined values of cadmium (byproduct from zinc concentrates), cement (portland), clays [fire (2009)], diatomite, gold (2008–09), lead, lime, olivine, sand and gravel (industrial), stone (dimension), zinc, and values indicated by symbol W	XX	258,000	XX	228,000	XX	289,000
Total	XX	749,000 r	XX	722,000 r	XX	650,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
WASHINGTON: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	10 r	1,230 r	$14,200 r	10	988	$9,150
Dolomite	15 r	122 r	633 r	14	102	454
Granite	11	1,420	14,900	9	885	8,630
Traprock	74 r	8,260 r	72,100 r	68	5,810	49,000
Sandstone and quartzite	4	779	12,900	7	717	13,000
Volcanic cinder and scoria	-- r	-- r	-- r	--	--	--
Miscellaneous stone	33 r	5,690 r	53,200 r	35	6,220	51,100
Total	XX	17,500 r	168,000 r	XX	14,700	131,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
WASHINGTON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	101	821
Riprap and jetty stone	124	1,870
Filter stone	89	872
Other coarse aggregate	18	70
Coarse aggregate, graded:		
Concrete aggregate, coarse	303	2,120
Bituminous aggregate, coarse	431	3,140
Bituminous surface-treatment aggregate	122	1,230
Railroad ballast	510	2,800
Other graded coarse aggregate	138	951
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	42	323
Other fine aggregate	3	66
Coarse and fine aggregate:		
Graded road base or subbase	1,120	6,830
Unpaved road surfacing	286	1,580
Crusher run or fill or waste	W	W
Roofing granules	W	W
Other coarse and fine aggregates	79	667
Other construction materials	80	1,380
Agricultural:		
Limestone	W	W
Poultry grit and mineral food	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Flux stone	W	W
Glass manufacture	W	W
Special:		
Asphalt fillers or extenders	W	W
Whiting or whiting substitute	W	W
Other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	45	843
Unspecified:[2]		
Reported	4,330	39,700
Estimated	5,320	48,500
Total	14,700	131,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
WASHINGTON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	308	3,280	W	W	W	W	--	--
Coarse aggregate, graded[3]	W	W	32	235	W	W	--	--
Fine aggregate (-¾ inch)[4]	205	2,030	W	W	W	W	--	--
Coarse and fine aggregate[5]	W	W	W	W	530	2,400	95	420
Other construction materials	3	36	--	--	77	1,350	--	--
Agricultural[6]	--	--	W	W	--	--	--	--
Chemical and metallurgical[7]	W	W	--	--	W	W	--	--
Special[8]	--	--	W	W	W	W	--	--
Other miscellaneous uses	5	27	--	--	40	816	--	--
Unspecified:[9]								
Reported	294	3,340	268	2,490	396	3,610	3,370	30,300
Estimated	4,160	38,000	806	6,980	356	3,560	--	--
Total	7,150	62,300	1,510	13,900	2,600	24,500	3,470	30,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone and poultry grit and mineral food.

[7]Includes cement, lime, and glass manufacture, and flux stone.

[8]Includes asphalt fillers or extenders, whiting or whiting substitute, and other fillers or extenders.

[9]Reported and estimated production without a breakdown by end use.

TABLE 5
WASHINGTON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	6,370	$62,100	$9.75
Plaster and gunite sands	10	102	10.20
Concrete products (blocks, bricks, pipe, decorative, etc.)	19	216	11.37
Asphaltic concrete aggregates and other bituminous mixtures	1,060	9,370	8.84
Road base and coverings[2]	4,780	30,200	6.32
Fill	2,010	11,300	5.63
Snow and ice control	99	582	5.88
Railroad ballast	86	679	7.90
Golf course	105	1,030	9.84
Other miscellaneous uses	43	400	9.30
Unspecified:[3]			
Reported	4,120	33,000	8.01
Estimated	11,200	80,700	7.23
Total or average	29,900	230,000	7.69

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes road and other stabilization (lime).

[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

WASHINGTON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	5,520	55,400	594	4,640	291	2,430
Asphaltic concrete aggregates and road base materials[3]	3,480	25,800	1,980	10,900	375	2,870
Fill	1,790	10,100	201	1,170	20	101
Snow and ice control	46	298	W	W	W	W
Railroad ballast	73	641	W	W	W	W
Other miscellaneous uses[4]	122	1,350	26	138	63	266
Unspecified:[5]						
Reported	963	8,090	1,340	10,400	1,540	12,000
Estimated	10,400	74,900	273	2,070	515	3,690
Total	22,400	177,000	4,410	29,400	2,800	21,400

	Unspecified districts	
Use	Quantity	Value
Concrete aggregates and concrete products[2]	--	--
Asphaltic concrete aggregates and road base materials[3]	--	--
Fill	--	--
Snow and ice control	--	--
Railroad ballast	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	281	2,480
Estimated	--	--
Total	281	2,480

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes golf course.

[5]Reported and estimated production without a breakdown by end use.

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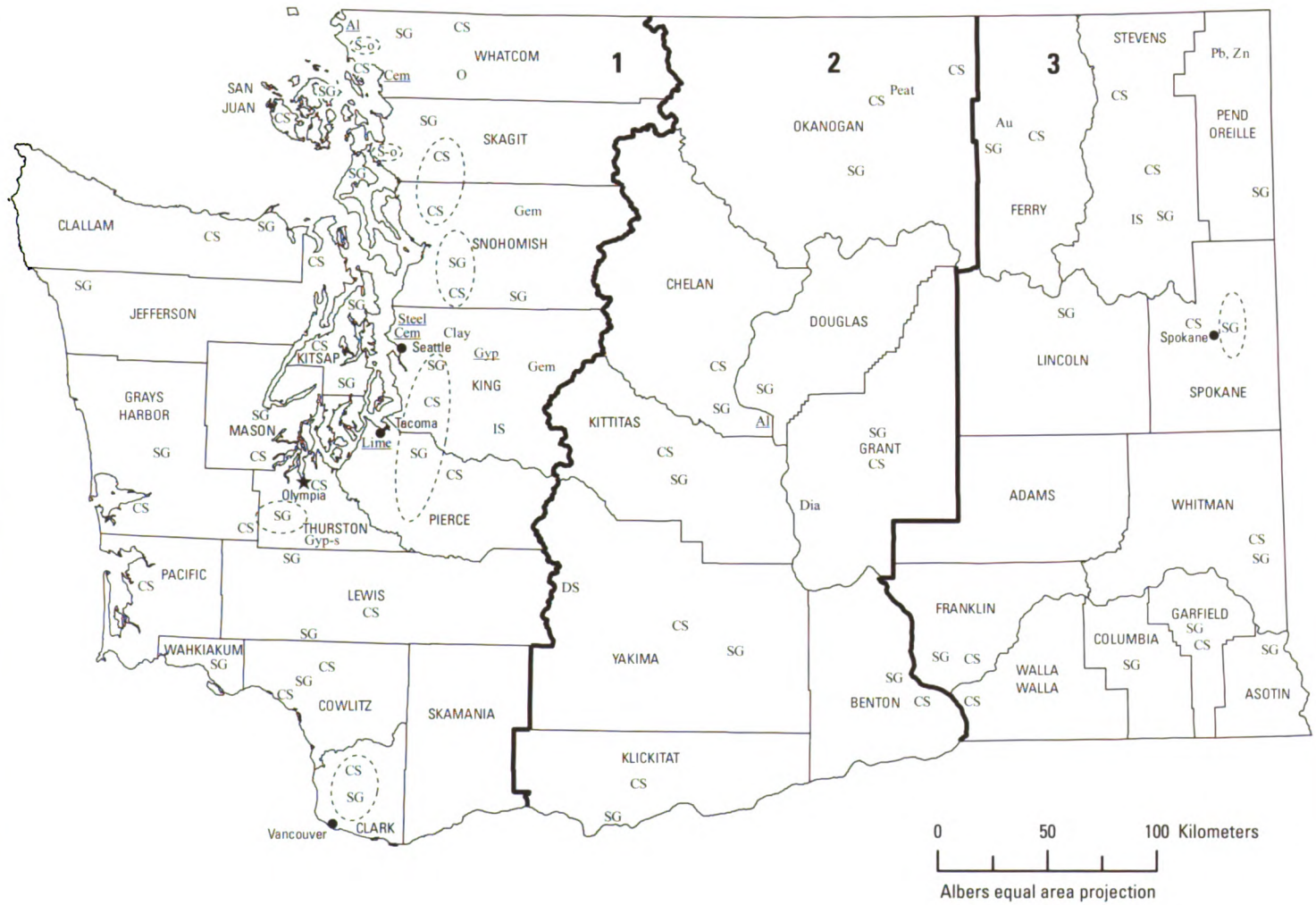
WASHINGTON



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Al	Aluminum plant
Au	Gold
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Dia	Diatomite
DS	Dimension stone
Gem	Gemstones
Gyp	Gypsum plant
Gyp-s	Synthetic gypsum
IS	Industrial sand
Lime	Lime plant
O	Olivine
Pb	Lead
Peat	Peat
SG	Construction sand and gravel
S-o	Sulfur (oil)
Steel	Steel plant
Zn	Zinc

Concentration of mineral operations

Source: Washington State Division of Geology and Earth Resources/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF WASHINGTON

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Washington Department of Natural Resources, Division of Geology and Earth Resources, for collecting information on all nonfuel minerals.

In 2009, Washington's nonfuel raw mineral production[1] was valued at $650 million, based upon annual U.S. Geological Survey (USGS) data. This was a nearly 10% decrease, or $72 million, from the $722 million total value for 2008, which was down by 3.6%, or $27 million, from that of 2007, $749 million. In spite of the decreases in total value, the State remained 29th in rank among the 50 States in total nonfuel raw mineral production value, accounting for slightly more than 1% of the U.S. total nonfuel mineral production value in 2009.

In 2009, Washington's leading nonfuel mineral commodities by production value were, in descending order of value, construction sand and gravel, gold, crushed stone, portland cement, and lime. Construction sand and gravel and crushed stone accounted for almost 56% of the State's total nonfuel mineral value, down significantly from 68% in 2008, primarily due to the 9.7 million metric ton (Mt) decrease in construction sand and gravel production and the 2.8 Mt decrease in crushed stone production.

The largest increase in production value in the State in 2009 took place with gold. Gold production, which resumed in 2008 in the State, increased four-fold with a five-fold increase in production value (actual values for gold withheld—company proprietary data). The next largest increase, a 294% increase in the production value of diatomite, was still significantly smaller than the increase in the production value of gold. Other increases in production values took place with lime, peat, and gemstones (lime and peat values withheld—company proprietary data).

The largest decreases in production value took place in construction sand and gravel, zinc, crushed stone, portland cement, and lead. The production value of construction sand and gravel was down $96 million, or almost 30%, from $326 million in 2008 to $230 million in 2009. The production value of crushed stone was down $37 million, from $168 million in 2008 to $131 million in 2009. Both mineral commodities had slight increases in production values from 2007 to 2008, although production levels were down by 13% for construction sand and gravel and almost 3% for crushed stone over the same time period.

Washington had significant metal production in 2009, although two of the major metals produced in the State—lead and zinc—had sharp declines. Zinc production increased almost 22% from 2007 to 2008, but declined by 86% from 2008 to 2009. Zinc production values, however, declined almost 30% from 2007 to 2008 and continued to decline by a further 88% from 2008 to 2009. Lead, which had increased 21% in production and 18% in production value from 2007 to 2008, and accounted for the largest increase in production value among all mineral commodities produced in the State in 2008, decreased by almost 83% and 88% from 2008 to 2009, respectively.

In 2009, Washington continued to be first in the quantities of olivine produced of the two olivine-producing States and fifth of five lead-producing States. The State decreased to fourth from third in the production of zinc. After rising to fifth in 2008, the State decreased to eighth in the production of construction sand and gravel in 2009. Primary aluminum and raw steel also were produced in Washington, but both metals were processed from materials acquired from foreign and other domestic sources. In 2009, notwithstanding a 17% decrease in production and almost 46% decrease in production value, the State remained third in rank, based on production, of the 10 States that produced primary aluminum.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WASHINGTON[1, 2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	84	170	88	360	W	W
Gemstones, natural	NA	49	NA	50	NA	65
Peat	W	66	W	75	W	W
Sand and gravel, construction	45,700 r	325,000 r	39,600 r	326,000 r	29,900	230,000
Stone, crushed	18,000	166,000	17,500 r	168,000 r	14,700	131,000
Combined values of cadmium (byproduct from zinc concentrates), cement (portland), clays [fire (2009)], diatomite, gold (2008–09), lead, lime, olivine, sand and gravel (industrial), stone (dimension), zinc, and values indicated by symbol W	XX	258,000	XX	228,000	XX	289,000
Total	XX	749,000 r	XX	722,000 r	XX	650,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined values" data. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
WASHINGTON: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008			2009		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone[2]	10 r	1,230 r	$14,200 r	10	988	$9,150
Dolomite	15 r	122 r	633 r	14	102	454
Granite	11	1,420	14,900	9	885	8,630
Traprock	74 r	8,260 r	72,100 r	68	5,810	49,000
Sandstone and quartzite	4	779	12,900	7	717	13,000
Volcanic cinder and scoria	-- r	-- r	-- r	--	--	--
Miscellaneous stone	33 r	5,690 r	53,200 r	35	6,220	51,100
Total	XX	17,500 r	168,000 r	XX	14,700	131,000

rRevised. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes limestone-dolomite reported with no distinction between the two.

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TABLE 3
WASHINGTON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	101	821
Riprap and jetty stone	124	1,870
Filter stone	89	872
Other coarse aggregate	18	70
Coarse aggregate, graded:		
Concrete aggregate, coarse	303	2,120
Bituminous aggregate, coarse	431	3,140
Bituminous surface-treatment aggregate	122	1,230
Railroad ballast	510	2,800
Other graded coarse aggregate	138	951
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	42	323
Other fine aggregate	3	66
Coarse and fine aggregate:		
Graded road base or subbase	1,120	6,830
Unpaved road surfacing	286	1,580
Crusher run or fill or waste	W	W
Roofing granules	W	W
Other coarse and fine aggregates	79	667
Other construction materials	80	1,380
Agricultural:		
Limestone	W	W
Poultry grit and mineral food	W	W
Chemical and metallurgical:		
Cement manufacture	W	W
Lime manufacture	W	W
Flux stone	W	W
Glass manufacture	W	W
Special:		
Asphalt fillers or extenders	W	W
Whiting or whiting substitute	W	W
Other fillers or extenders	W	W
Other miscellaneous uses and specified uses not listed	45	843
Unspecified:[2]		
Reported	4,330	39,700
Estimated	5,320	48,500
Total	14,700	131,000

W Withheld to avoid disclosing company proprietary data; included in "Total."

[1]Data are rounded to no more than three significant digits; may not add totals shown.

[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
WASHINGTON: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	308	3,280	W	W	W	W	--	--
Coarse aggregate, graded[3]	W	W	32	235	W	W	--	--
Fine aggregate (-⅜ inch)[4]	205	2,030	W	W	W	W	--	--
Coarse and fine aggregate[5]	W	W	W	W	530	2,400	95	420
Other construction materials	3	36	--	--	77	1,350	--	--
Agricultural[6]	--	--	W	W	--	--	--	--
Chemical and metallurgical[7]	W	W	--	--	W	W	--	--
Special[8]	--	--	W	W	W	W	--	--
Other miscellaneous uses	5	27	--	--	40	816	--	--
Unspecified:[9]								
Reported	294	3,340	268	2,490	396	3,610	3,370	30,300
Estimated	4,160	38,000	806	6,980	356	3,560	--	--
Total	7,150	62,300	1,510	13,900	2,600	24,500	3,470	30,700

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.
[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes limestone and poultry grit and mineral food.
[7]Includes cement, lime, and glass manufacture, and flux stone.
[8]Includes asphalt fillers or extenders, whiting or whiting substitute, and other fillers or extenders.
[9]Reported and estimated production without a breakdown by end use.

TABLE 5
WASHINGTON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	6,370	$62,100	$9.75
Plaster and gunite sands	10	102	10.20
Concrete products (blocks, bricks, pipe, decorative, etc.)	19	216	11.37
Asphaltic concrete aggregates and other bituminous mixtures	1,060	9,370	8.84
Road base and coverings[2]	4,780	30,200	6.32
Fill	2,010	11,300	5.63
Snow and ice control	99	582	5.88
Railroad ballast	86	679	7.90
Golf course	105	1,030	9.84
Other miscellaneous uses	43	400	9.30
Unspecified:[3]			
Reported	4,120	33,000	8.01
Estimated	11,200	80,700	7.23
Total or average	29,900	230,000	7.69

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes road and other stabilization (lime).
[3]Reported and estimated production without a breakdown by end use.

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TABLE 6

WASHINGTON: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	5,520	55,400	594	4,640	291	2,430
Asphaltic concrete aggregates and road base materials[3]	3,480	25,800	1,980	10,900	375	2,870
Fill	1,790	10,100	201	1,170	20	101
Snow and ice control	46	298	W	W	W	W
Railroad ballast	73	641	W	W	W	W
Other miscellaneous uses[4]	122	1,350	26	138	63	266
Unspecified:[5]						
Reported	963	8,090	1,340	10,400	1,540	12,000
Estimated	10,400	74,900	273	2,070	515	3,690
Total	22,400	177,000	4,410	29,400	2,800	21,400

	Unspecified districts	
Use	Quantity	Value
Concrete aggregates and concrete products[2]	--	--
Asphaltic concrete aggregates and road base materials[3]	--	--
Fill	--	--
Snow and ice control	--	--
Railroad ballast	--	--
Other miscellaneous uses[4]	--	--
Unspecified:[5]		
Reported	281	2,480
Estimated	--	--
Total	281	2,480

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (lime).

[4]Includes golf course.

[5]Reported and estimated production without a breakdown by end use.

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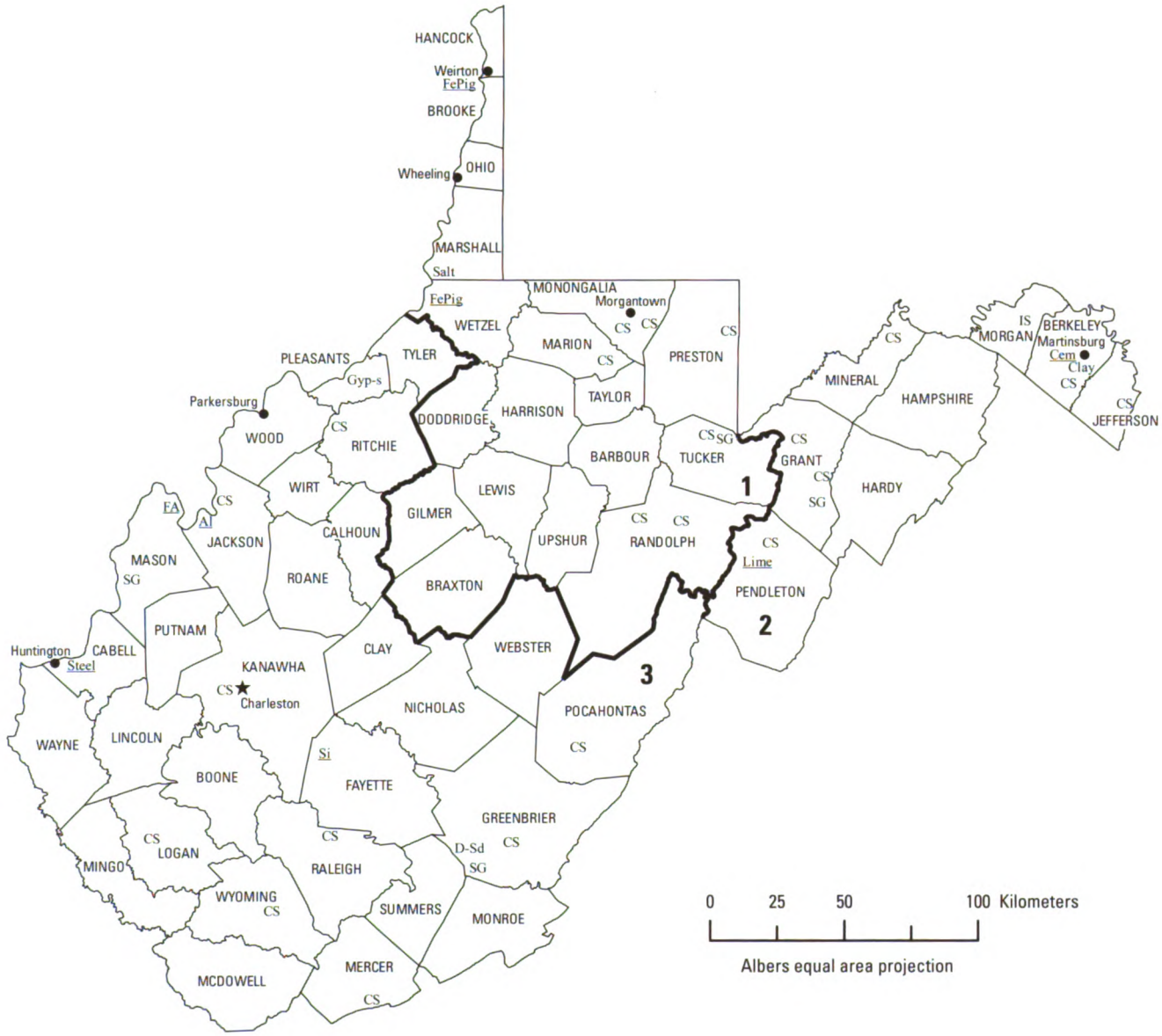

LEGEND

- County boundary
- ★ Capital
- ● City
- 1 —— Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS (Principal producing areas)

Al	Aluminum plant
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
D-Sd	Dimension sandstone
FA	Ferroalloy plant
FePig	Iron oxide pigment plant
Gyp-s	Synthetic gypsum
IS	Industrial sand
Lime	Lime plant
Salt	Salt
SG	Construction sand and gravel
Si	Silicon metal plant
Steel	Steel plant

Source: West Virginia Geological and Economic Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF WEST VIRGINIA

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the West Virginia Geological and Economic Survey for collecting information on all nonfuel minerals.

In 2009, West Virginia's nonfuel raw mineral production[1] was valued at $215 million, based upon annual U.S. Geological Survey (USGS) data. This was an $18 million, or almost 8%, decrease from the State's total nonfuel mineral production value of $234 million in 2008, which was an $8 million, or 3.5%, increase from that of 2007. West Virginia ranked 40th among the 50 States for total nonfuel mineral production value, accounting for 0.37% of the United States total production value of $59 billion in 2009.

Based upon production value, crushed stone continued to be West Virginia's leading nonfuel mineral commodity in 2009, accounting for almost 59% of the State's total nonfuel mineral production value, up from 54% in 2008. Portland cement, lime, industrial sand and gravel, and masonry cement followed and accounted for, along with crushed stone, almost 97% of the State's total value of nonfuel raw mineral production.

Excluding gemstones, for which production data are not available from 2007 to 2009, the only nonfuel mineral commodity produced in the State to increase in production value was lime (actual values withheld—company proprietary data). Lime saw an almost 13% increase in production value, although production was down 2% from 2008.

The largest decrease in production value took place with portland cement, of which the production value was down 24% and production down almost 22% (actual data withheld—company proprietary data). It was followed by industrial sand and gravel, masonry cement, salt, and crushed stone. These four mineral commodities were down a combined $8.6 million. The production value of crushed stone, which had increased by $12 million, or 10%, from 2007 to 2008, decreased only by $1 million in 2009. However, production was down by 2.7 million metric tons (Mt), from 15.2 Mt in 2008 to 12.5 Mt in 2009.

West Virginia continued to rank 10th among the 16 salt-producing States. The State's mines produced industrial minerals and coal; no metals were mined in West Virginia. Processing and refining of metallic products, including aluminum, iron oxide pigments, and steel, occurred along the State's Ohio River border with Ohio. Primary aluminum and raw steel were produced in the State, but both metals were processed from materials acquired from foreign and other domestic sources. In 2009, West Virginia remained 10th in the Nation in the production of primary aluminum among 10 producing States, with production centered in Jackson County. One company in Fayette County, southeast of Charleston, produced silicon metal. Steel was produced in Cabell County. Iron oxide pigments were produced near Weirton in Hancock County and in Wetzel County. Felman Production Inc.'s plant in Letart, Mason County, produced ferrosilicomanganese, a ferroalloy.

[1] The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WEST VIRGINIA[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	1	NA	1	NA	1
Sand and gravel:						
Construction	675	5,620	426	3,840	410	3,480
Industrial	345	17,600	338	17,200	241	14,700
Stone, crushed	14,600	115,000	15,200 r	127,000 r	12,500	126,000
Combined values of cement, clays (common), lime, peat (2007), salt, stone (dimension sandstone)	XX	87,400	XX	85,300 r	XX	71,600
Total	XX	226,000	XX	234,000 r	XX	215,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
WEST VIRGINIA: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone	27 r	13,800 r	$114,000 r	27	11,400	$113,000
Sandstone and quartzite	8 r	1,400 r	13,800 r	10	1,130	12,300
Miscellaneous stone	1	2	15	3	36	321
Total	XX	15,200 r	127,000 r	XX	12,500	126,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 3
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	118	1,660
Filter stone	W	W
Other coarse aggregate	143	826
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous aggregate, coarse	2,050	18,100
Bituminous surface-treatment aggregate	W	W
Railroad ballast	W	W
Other graded coarse aggregate	138	1,210
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	200	1,880
Screening, undesignated	W	W
Other fine aggregate	60	492
Coarse and fine aggregate:		
Graded road base or subbase	993	20,500
Unpaved road surfacing	W	W
Crusher run or fill or waste	W	W
Other coarse and fine aggregates	110	665
Other construction materials	117	896
Agricultural, limestone	W	W
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]		
Reported	6,920	63,500
Estimated	381	3,400
Total	12,500	126,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4
WEST VIRGINIA: CRUSHED STONE SOLD OR USED BY PRODUCERS
IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch)[2]	W	W	W	W	W	W
Coarse aggregate, graded[3]	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	W	W	W	W
Coarse and fine aggregate[5]	W	W	W	W	W	W
Other construction materials	114	887	--	--	3	9
Agricultural[6]	W	W	--	--	W	W
Chemical and metallurgical[7]	--	--	W	W	--	--
Unspecified:[8]						
Reported	3,860	33,900	1,230	11,300	1,830	18,300
Estimated	159	1,420	222	1,980	--	--
Total	4,540	39,200	4,470	50,300	3,530	36,300

W Withheld to avoid disclosing company proprietary data; included in "Total."-- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.
[5]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.
[6]Includes limestone.
[7]Includes cement manufacture.
[8]Reported and estimated production without a breakdown by end use.

TABLE 5
WEST VIRGINIA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	7	$58	$8.29
Unspecified:[2]			
Reported	2	13	6.50
Estimated	402	3,410	8.48
Total or average	410	3,480	8.47

[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Estimated and reported production without a breakdown by end use.

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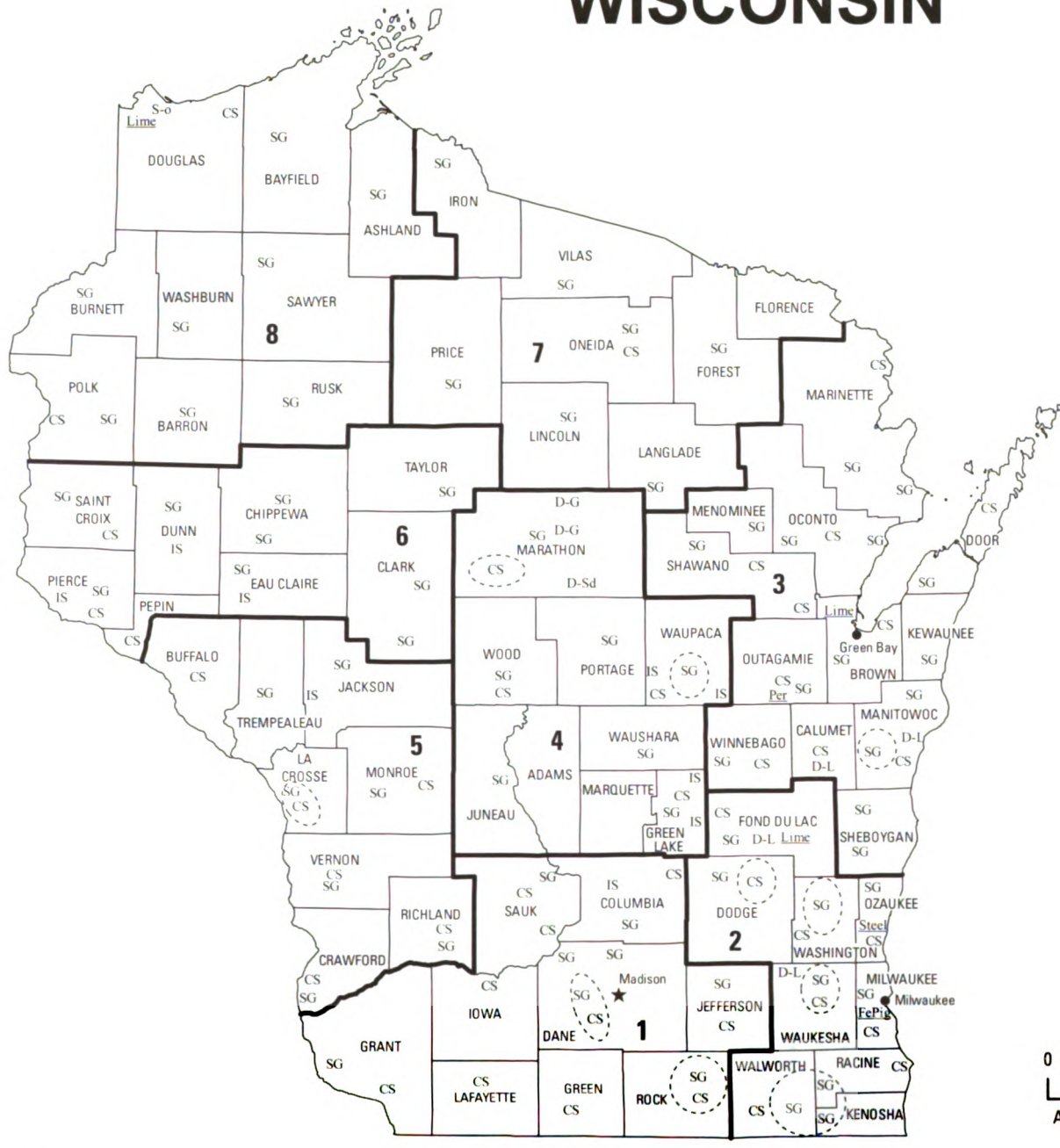
WISCONSIN



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 — Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

CS	Crushed stone
D-G	Dimension granite
D-L	Dimension limestone
D-Sd	Dimension sandstone
FePig	Iron oxide pigment plant
IS	Industrial sand
Lime	Lime plant
Per	Perlite plant
S-o	Sulfur (oil)
SG	Construction sand and gravel
Steel	Steel plant
◯	Concentration of mineral operations

Source: Wisconsin Geological and Natural History Survey/U.S. Geological Survey (2009).

Original from THE OHIO STATE UNIVERSITY

THE MINERAL INDUSTRY OF WISCONSIN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wisconsin Geological and Natural History Survey for collecting information on all nonfuel minerals.

In 2009, Wisconsin's nonfuel raw mineral production[1] was valued at $546 million, based upon annual U.S. Geological Survey (USGS) data. This was a $106 million, or 16%, decrease from the State's total nonfuel mineral value of $652 million in 2008, which was up by $67 million, or 11%, from $585 million in 2007. The State declined in rank from 32d to 33d among the 50 States in total nonfuel mineral production value and accounted for slightly less than 1% of the U.S. total production value.

Crushed stone, construction sand and gravel, and industrial sand and gravel were (in descending order of total production value) Wisconsin's leading nonfuel minerals in 2009, accounting for 36%, 26%, and 19%, respectively, of the State's reportable total nonfuel raw mineral production value (table 1). These were followed by lime and dimension stone, accounting for almost 13% and about 5% of the State's total nonfuel mineral value, respectively.

No mineral commodity produced in the State in 2009 rose in either production or production value. The production value of gemstones produced in the State remained the same as in 2008. The largest decrease in production value took place with construction sand and gravel, down almost $47 million, followed by crushed stone, industrial sand and gravel, dimension stone, and lime, down almost $40 million, $15 million, $3.5 million, and $1.4 million, respectively.

The production value of crushed stone increased from 2007 to 2008, by $47 million, although with a 21% decline in production. From 2008 to 2009, production declined by almost 12%, but the production value of this mineral commodity rose to be 3.7% above that of 2007. Industrial sand and gravel experienced a similar peak in 2008 for production value, although production was up 24% from that of 2007 to 2008. Construction sand and gravel and dimension stone have been experiencing declining production and production values since 2007, with the production of construction sand and gravel in 2009 down 25% from that of 2007, and the production of dimension stone down almost 33%. Lime production has declined by about 100,000 metric tons each year since 2007 (an aggregate decrease of 22%), although the production value total of $70.1 million in 2009 was only 10% less than the total of $78 million in 2007. Owing to the recession, one of the four lime plants in Wisconsin was idle part of the year.

In 2009, Wisconsin rose to second from third in rank for the quantity of industrial sand and gravel produced, accounting for 11% of the Nation's total of almost 24.6 million metric tons (Mt) produced. The State continued to rank second in dimension stone production. The State had ranked first, ahead of Texas, from 2006 to 2007. The State continued to rank ninth for lime production. Wisconsin decreased to 10th from 8th for the total quantity of construction sand and gravel produced, 29 Mt, which accounted for approximately 3.5% of the Nation's total of 836 Mt produced. For comparison, California, the leading producer of construction sand and gravel, produced 79 Mt, accounting for 9.5% of the Nation's total. Steel and iron oxide pigments were produced at locations throughout the State, but from material obtained from other domestic and foreign sources.

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WISCONSIN[1,2]

(Thousand metric tons and thousand dollars)

Mineral	2007		2008		2009	
	Quantity	Value	Quantity	Value	Quantity	Value
Gemstones, natural	NA	6	NA	7	NA	7
Lime	959	78,000	852	71,500	751	70,100
Peat	W	26	W	26	--	--
Sand and gravel:						
Construction	39,000 r	189,000 r	36,200 r	190,000 r	29,100	143,000
Industrial	2,650	90,100	3,290	120,000	2,730	105,000
Stone:						
Crushed	32,800	191,000	25,900	238,000 r	22,900	198,000
Dimension	307	35,900	250	33,300	207	29,800
Total	XX	585,000 r	XX	652,000 r	XX	546,000

rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.
[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
WISCONSIN: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	212 r	21,600	$127,000	187	19,100	$119,000
Dolomite	8	482	2,340	4	117	789
Granite	9	2,170	10,700	9	1,780	7,880
Traprock	4	1,420	95,800	4	1,420	67,400
Miscellaneous stone	3	218	1,270	6	466	2,640
Total	XX	25,900	238,000 r	XX	22,900	198,000

rRevised. XX Not applicable.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Riprap and jetty stone	494	1,390
Filter stone	173	1,050
Other coarse aggregate	175	1,270
Coarse aggregate, graded:		
Concrete aggregate, coarse	108	867
Bituminous aggregate, coarse	70	269
Bituminous surface-treatment aggregate	W	W
Other graded coarse aggregate	1,130	6,070
Fine aggregate (-⅜ inch):		
Stone sand, concrete	W	W
Stone sand, bituminous mix or seal	W	W
Screening, undesignated	192	640
Other fine aggregate	310	1,870
Coarse and fine aggregates:		
Graded road base or subbase	2,210	9,800
Unpaved road surfacing	W	W
Crusher run or fill or waste	595	1,740
Roofing granules	W	W
Other coarse and fine aggregates	1,560	8,510
Other construction materials	50	236
Agricultural:		
Limestone	265	3,610
Poultry grit and mineral food	W	W
Other agricultural uses	56	248
Unspecified:[2]		
Reported	716	3,710
Estimated	14,000	93,200
Total	22,900	198,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported and estimated production without a breakdown by end use.

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TABLE 4

WISCONSIN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	136	859	W	W	W	W	--	--
Coarse aggregate, graded[3]	W	W	W	W	W	W	W	W
Fine aggregate (-⅜ inch)[4]	W	W	354	1,850	W	W	--	--
Coarse and fine aggregate[5]	1,750	8,420	1,800	8,240	W	W	W	W
Other construction materials	50	236	--	--	--	--	--	--
Agricultural[6]	233	1,420	W	W	W	W	--	--
Unspecified:[7]								
Reported	--	--	--	--	--	--	674	3,500
Estimated	3,410	23,400	3,510	23,800	2,020	14,200	1,540	7,170
Total	5,760	35,500	7,290	43,200	3,330	79,600	2,440	11,700

	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1½ inch)[2]	W	W	--	--	--	--	--	--
Coarse aggregate, graded[3]	W	W	--	--	--	--	--	--
Fine aggregate (-⅜ inch)[4]	W	W	--	--	--	--	--	--
Coarse and fine aggregate[5]	W	W	--	--	--	--	--	--
Other construction materials	--	--	--	--	--	--	--	--
Agricultural[6]	W	W	--	--	--	--	--	--
Unspecified:[7]								
Reported	--	--	41	214	--	--	--	--
Estimated	2,110	14,800	721	4,910	95	669	583	4,260
Total	2,650	17,600	762	5,120	95	669	583	4,260

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes filter stone, riprap and jetty stone, and other coarse aggregates.

[3]Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and other graded coarse aggregates.

[4]Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregates.

[5]Includes crusher run or fill or waste, graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.

[6]Includes limestone, poultry grit and mineral food, and other agricultural uses.

[7]Reported and estimated production without a breakdown by end use.

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TABLE 5
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	2,740	$14,600	$5.30
Plaster and gunite sands	899	5,180	5.76
Concrete products (blocks, bricks, pipe, decorative, etc.)	106	462	4.36
Asphaltic concrete aggregates and other bituminous mixtures	1,430	7,590	5.32
Road base and coverings	3,260	13,600	4.17
Road stabilization (cement and lime)	75	436	5.81
Fill	1,600	6,720	4.20
Snow and ice control	168	774	4.61
Roofing granules	4	28	7.00
Other miscellaneous uses[2]	186	2,370	12.73
Unspecified:[3]			
Reported	1,260	6,940	5.53
Estimated	17,400	84,600	4.87
Total or average	29,100	143,000	4.92

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
[2]Includes filtration and railroad ballast.
[3]Reported and estimated production without a breakdown by end use.

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TABLE 6
WISCONSIN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	429	2,980	2,480	12,200	334	1,480
Asphaltic concrete aggregates and road base materials[3]	W	W	1,670	6,550	419	1,650
Fill	96	419	1,040	4,110	105	365
Other miscellaneous uses[4]	956	5,030	60	332	36	202
Unspecified:[5]						
Reported	139	889	8	46	229	1,110
Estimated	2,060	10,900	3,920	19,000	2,430	10,900
Total	3,680	20,300	9,180	42,200	3,550	15,700
	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	W	W	W	W	270	1,280
Asphaltic concrete aggregates and road base materials[3]	187	977	W	W	586	3,020
Fill	9	27	186	1,390	86	130
Other miscellaneous uses[4]	129	571	332	1,850	101	1,570
Unspecified:[5]						
Reported	817	4,500	6	51	16	184
Estimated	2,430	11,800	1,340	6,520	2,440	12,200
Total	3,570	17,900	1,870	9,810	3,500	18,400
	District 7		District 8		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products[2]	W	W	W	W	--	--
Asphaltic concrete aggregates and road base materials[3]	172	760	294	1,260	250	1,050
Fill	48	145	29	126	--	--
Other miscellaneous uses[4]	109	1,930	49	276	--	--
Unspecified:[5]						
Reported	25	80	17	79	--	--
Estimated	1,130	5,420	807	3,920	816	3,960
Total	1,480	8,340	1,200	5,660	1,070	5,010

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement and lime).

[4]Includes filtration, railroad ballast, roofing granules, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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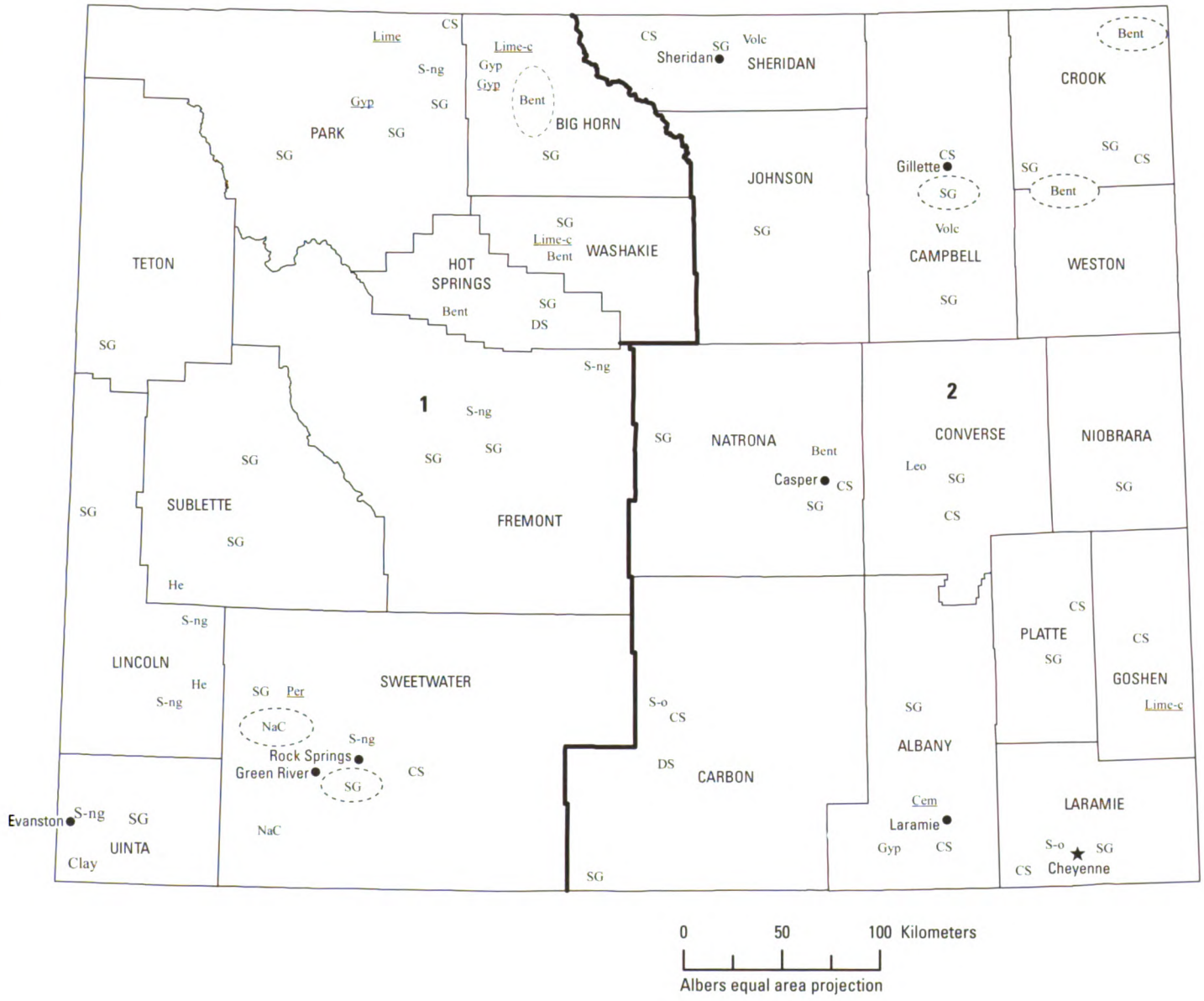
WYOMING



LEGEND

- County boundary
- ★ Capital
- ● City
- 1 Crushed stone/sand and gravel district boundary

MINERAL SYMBOLS
(Principal producing areas)

Bent	Bentonite
Cem	Cement plant and quarry
Clay	Common clay
CS	Crushed stone
DS	Dimension stone
Gyp	Gypsum
Gyp	Gypsum plant
He	Helium
Leo	Leonardite
Lime	Lime plant
Lime-c	Lime plant (captive)
NaC	Sodium carbonate
Per	Perlite plant
SG	Construction sand and gravel
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
Volc	Volcanic cinder
⬭	Concentration of mineral operations

Source: Wyoming State Geological Survey/U.S. Geological Survey (2009).

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THE MINERAL INDUSTRY OF WYOMING

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wyoming State Geological Survey for collecting information on all nonfuel minerals.

In 2009, Wyoming's nonfuel raw mineral production[1] was valued at $1.8 billion, based upon annual U.S. Geological Survey (USGS) data. This was a $230 million, or 11%, decrease from the State's total nonfuel mineral production value of $2.03 billion in 2008, which was up almost $277 million, or 16%, from a total of $1.76 billion in 2007. Even though the State's total production value was down in 2009 compared to that of 2008, the State rose in rank to 10th in 2009 from 11th in 2008, which in turn was up from 14th in 2007, among the 50 States in total nonfuel raw mineral production value. This is the highest rank for the State since 1992. In 2009, Wyoming accounted for 3.05% of the U.S. total production value, up from 2.8% in 2008. For the fourth consecutive year, the State ranked second in the Nation for the per capita production value of its nonfuel mineral industry. With a total population increase of 11,000, up to 544,000 in 2009 from 533,000 in 2008, the production value per capita was about $3,310, a decline of $470 per person, but 17 times the national average of $192 per capita.

Soda ash remained Wyoming's leading nonfuel mineral, by production value, followed by Grade-A helium, bentonite clay, construction sand and gravel, crushed stone, and portland cement. Together, these six mineral commodities have accounted for approximately 99% of the State's total nonfuel raw mineral production value since 2005.

Of the eleven mineral commodities produced in Wyoming in 2009, all but three declined in production value. The largest increase in production and production value took place with crushed stone, up approximately $18 million to over $75 million in 2009 from $57 million in 2008, followed by common clays, up $15,000, and gemstones, which saw no change in production value between 2008 and 2009. The quantity of crushed stone produced in Wyoming increased by 3.9 million metric tons (Mt) to 16 Mt from 12.1 Mt. This is a 10-year maximum for crushed stone production in the State: from 1999 to 2005, the State averaged 5.8 Mt of crushed stone production and 12.4 Mt from 2006 to 2008. The lowest level of crushed stone production in Wyoming was 2001, where only 4.4 Mt was produced.

Soda ash, which had the largest increase in production value—almost 19%—of any mineral commodity produced in the State from 2007 to 2008, saw the largest decrease in production value, almost 12%, in 2009 (actual values withheld—company proprietary data). Soda ash was followed by decreases in the production values of bentonite clay, portland cement, construction sand and gravel, and Grade–A helium.

Since at least 1986,[2] Wyoming continued to be ranked first in soda ash and bentonite clay production, and since at least 1987, second in Grade-A helium production. Since 2005, Wyoming has been one of only two soda ash-producing States, with California producing a significantly smaller amount. In 2009, the United States continued to be the world's leading producer of soda ash from natural sources and the second leading producer, after China, of natural and synthetic soda ash. Sweetwater County hosts the world's largest known deposit of trona, the major ore for soda ash production.

The Wyoming State Geological Survey[3] (WSGS) provided the following narrative information. Production data in the text that follows are reported by the WSGS and are based on the agency's own surveys and estimates. They may differ from production figures reported to the USGS.

Exploration and Development

Industrial Minerals

Gemstones.—Amateur rock collectors continued to comprise the majority of gemstone activity in Wyoming in 2009. Many rock and mineral clubs reported growth for those interested in low-budget activities, especially for families. Amateur interest ranged across the State's wide variety of precious and semiprecious gemstones, including chalcedony, agate, jade, corundum, and other rock types for both lapidary and academic interests.

Commercial activity, after the economic downturn in 2008, remained at low levels in 2009. Minor commercial collection of jade and various lapidary materials was reported across the State, but no significant production occurred. Individual prospectors continued to search for kimberlite and diamonds but no companies pursued larger, more organized samplings or other exploration activities. Previously held kimberlite or diamond claims appeared to have been maintained. The partial recovery of rough diamond prices in late 2009 and the predicted continued recovery in 2010 suggested a short-term resumption of more serious diamond exploration in the State.

Metals

Overview.—Metals exploration in Wyoming remained at relatively low levels during 2009 in response to the overall

[1]The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2009 USGS mineral production data published in this chapter are those available as of September 2011. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL http://minerals.usgs.gov/minerals.

[2]The U.S. Bureau of Mines began to publish detailed mineral commodity rankings among States in the 1986 edition of the Minerals Yearbook.

[3]Wayne M. Sutherland, Geologist (gemstones, metals, and economic geology specialist), and Robert Gregory, Geologist (uranium and minerals specialist) of the Wyoming State Geological Survey, coauthored the text of the State mineral industry information.

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economy. Copper and platinum-group metals prices, even after substantially recovering during most of 2009 after their fall in late 2008 and early 2009, remained insufficient to stimulate renewed exploration during 2009. Exploration activities for gold and rare earths, however, continued.

Gold.—Gold prices remained sufficiently high in 2009 to continue exploration, though efforts remained limited. Individual prospectors continued their activities across the State, but only one company, Evolving Gold Corp. (Vancouver, British Columbia, Canada), garnered widespread news media coverage for their exploration project in the State.

After confirming the coexistence of high-grade gold zones surrounded by a large halo of low-grade gold mineralization at the Rattlesnake Hills project west of Casper in Natrona County, Evolving Gold Corp. drilled almost 30,000 meters (m) in 78 holes in 2009. The company's exploration budget was reported as strong (Evolving Gold Corp., 2009a). Drilling results from the company's two target areas, Antelope Basin and North Stock, continued to generate long intercepts of potential bulk tonnage gold mineralization. Intercepts included 121 m at 1.15 grams per metric ton (g/t) (0.034 troy ounces per short ton (oz/T)) gold in drill hole RSC–049, and 128 m at 1.09 g/t (0.032 oz/T) gold in drill hole RSC–043, which included 5 m at 10.2 g/t (0.297 oz/T). The company's 2009 field sampling and mapping projects identified five additional new gold targets in the project area, which the company plans to drill in 2010 while continuing to delineate the main targets. The company planned to complete and release an updated Canadian National Instrument 43–101 report during the second quarter of 2010 (Evolving Gold Corp., 2009b). The NI 43–101 report is a Canadian Securities rule designed to ensure that the public disclosure of information, such as resource estimates, related to publicly traded mining-related stocks, achieves a reasonable degree of reliability so as to not mislead investors.

Golden Predator Royalty and Development Co. (a subsidiary of Golden Predator Mines Inc., of Vancouver, British Columbia, Canada) announced the lease of the Mineral Hill property, comprised of 20 patented and 69 unpatented mining claims in the Mineral Hill District of Crook County, in the extreme northeastern portion of the State. The Mineral Hill District is an alkaline gold system, similar to Evolving Gold Corp.'s Rattlesnake Hills project (Golden Predator Royalty and Development Corp., 2009).

Rare Earths.—In March, Rare Element Resources Ltd. (White Rock, British Columbia, Canada) released its NI 43–101-compliant mineral resource estimate of rare earth elements (REE) contained in the Bull Hill Southwest deposit of its Bear Lodge project. The company reported an initial 9.8-million-ton inferred mineral resource averaging 4.07% rare-earth oxides, with a cutoff grade of 1.5%. The estimate only addressed dike sets in the Bull Hill Southwest area where there is additional potential for expansion of the resource. Further potential exists for definition of other resources within the Bear Lodge property (Rare Element Resources Ltd., 2009a). The company released its NI 43–101 report in April, reporting that rare-earth oxides were present in the Bull Hill deposit—in order of decreasing abundance, CeO_2, La_2O_3, Pr_6O_{11}, Sm_2O_3, and others. More than 50% of the REE distribution on the property includes lanthanum, neodymium, praseodymium, and samarium (Rare Element Resources Ltd., 2009b). The company also announced the drill program in June (Rare Element Resources Ltd., 2009c) and announced a preliminary economic assessment and scoping study of the development potential of the property in October. The study, scheduled to be completed by midyear 2010, was expected to address metallurgy, environment analyses, permitting, as well as preliminary mine, plant, and geotechnical engineering (Rare Element Resources Ltd., 2009d).

Commodity Review

Industrial Minerals

Bentonite.—Bentonite production is estimated to be down about 27% from that of 2008. Nationally, uses of the material include as absorbents (accounting for 31% of total U.S. bentonite production), in domestic oil and gas development as drilling mud (20%), in iron ore pelletizing (15%), and foundry sand (15%) (Virta, 2011, p. 18.11).

Soda Ash.—Soda ash [also known as sodium carbonate (Na_2CO_3)] is refined from trona. In southwestern Wyoming, trona is found as an evaporite mineral in the Wilkins Peak Member of the Eocene Green River Formation. The Wilkins Peak Member consists of trona beds up to about 12 m (40 feet) thick separated intermittently by shale-like sediments, sandstone, and carbonate rocks at depths between roughly 180–610 m (about 600–2,000 feet). Approximately 1.8 metric tons (t) of trona, which is roughly 70% sodium carbonate, are required to produce 1 t of refined soda ash. Wyoming hosts the world's largest trona deposits with an estimated resource of more than 115 billion metric tons (127 billion short tons) (Leigh, 1998). Four companies operate five plants in the Green River Basin in southwestern Wyoming—primarily Sweetwater County—and accounted for the vast majority of the approximately 9.3 Mt of all soda ash produced in the United States in 2009. Total U.S. production in 2009 was valued over $1.3 billion. Reduced production in 2009 resulted from the worldwide economic downturn that began in 2007. Poor market conditions, resulting from reduced demand for automotive and housing glass and fiberglass during 2009, combined with competition from the heavily subsidized Chinese synthetic soda ash industry, caused cutbacks that eventually cost about 100 jobs in southwestern Wyoming's trona patch (Gearino, 2010). Glass (48%), chemicals (29%), and soap and detergents (10%) accounted for an estimated 87% of the end uses for soda ash in 2009 (Kostick, 2010).

Stone, Crushed.—Pete Lien & Sons, Inc. (Rapid City, SD) remained in the permitting process for the new high-purity limestone quarry 16 km north of Laramie. The limestone is part of the Casper Formation, which crops out extensively along the western flank of the Laramie Mountains. Construction of the quarry and plant was expected to begin in late 2009, but did not commence by yearend and had no announced schedule. The plant was to employ about 50 workers.

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Government Activities

The WSGS continued to be an active participant in the STATEMAP program. STATEMAP is a component of the congressionally mandated National Cooperative Geologic Mapping Program (NCGMP), through which the USGS distributes Federal funds to support geologic mapping efforts through a competitive funding process. The NCGMP has three primary components: (1) FEDMAP, which funds Federal geologic mapping projects; (2) STATEMAP, which is a matching-funds grant program with State geological surveys; and (3) EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. For additional information on the State's minerals and minerals production, geologic maps, recently printed and digital publications, and further information on the geology of Wyoming, visit the WSGS home page at http://www.wsgs.uwyo.edu/.

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TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN WYOMING[1,2]

(Thousand metric tons and thousand dollars)

	2007		2008		2009	
Mineral	Quantity	Value	Quantity	Value	Quantity	Value
Clays:						
Bentonite	4,250	227,000	4,400 r	233,000 r	3,230	172,000
Common	59	226	37	89	41	104
Gemstones, natural	NA	15	NA	14	NA	14
Sand and gravel, construction	19,500 r	98,300 r	17,500 r	103,000 r	17,200	92,200
Stone, crushed	12,500	61,400	12,100	57,100	16,000	75,400
Combined values of cement (portland), gypsum (crude), helium (Grade-A), lime, soda ash, stone [dimension (2008–09)], zeolites (2007)	XX	1,370,000	XX	1,640,000	XX	1,460,000
Total	XX	1,760,000	XX	2,030,000 r	XX	1,800,000

rRevised. NA Not available. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Data are rounded to no more than three significant digits; may not add to totals shown.

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TABLE 2
WYOMING: CRUSHED STONE SOLD OR USED, BY TYPE[1]

Type	2008 Number of quarries	2008 Quantity (thousand metric tons)	2008 Value (thousands)	2009 Number of quarries	2009 Quantity (thousand metric tons)	2009 Value (thousands)
Limestone[2]	16	3,800 r	$22,700 r	13	3,420	$21,800
Granite	1	2,330	14,200	--	--	--
Volcanic cinder and scoria	12	3,290 r	18,500 r	9	6,880	34,400
Miscellaneous stone	3 r	2,680 r	1,710 r	4	5,710	19,300
Total	XX	12,100	57,100	XX	16,000	75,400

rRevised. XX Not applicable. -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes limestone-dolomite reported with no distinction between the two.

TABLE 3
WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009, BY USE[1]

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+ 1½ inch), other	W	W
Coarse aggregate, graded:		
Concrete aggregate, coarse	W	W
Bituminous surface-treatment aggregate	W	W
Other graded coarse aggregate	W	W
Coarse and fine aggregates:		
Graded road base or subbase	101	950
Unpaved road surfacing	W	W
Terrazzo and exposed aggregate	W	W
Crusher run or fill or waste	W	W
Chemical and metallurgical, cement manufacture	W	W
Unspecified:[2]	10,900	49,700
Reported	14,900	69,200
Estimated	102	605
Total	16,000	75,400

W Withheld to avoid disclosing company proprietary data; included in "Total."
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Reported production without a breakdown by end use.

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TABLE 4
WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+ 1½ inch)[2]	--	--	W	W	--	--
Coarse aggregate, graded[3]	--	--	W	W	--	--
Coarse and fine aggregate[4]	(5)	(5)	W	W	--	--
Chemical and metallurgical[6]	--	--	W	W	--	--
Unspecified:[7]						
Reported	209	1,640	11,900	66,700	2,850	868
Estimated	--	--	102	605	--	--
Total	209	1,640	12,900	72,900	2,850	868

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes other coarse aggregate.

[3]Includes concrete aggregate (coarse), bituminous surface-treatment, and other graded coarse aggregate.

[4]Includes crusher run or fill or waste, graded road base or subbase, unpaved road surfacing, and terrazzo and exposed aggregate.

[5]Withheld to avoid to avoid disclosing company proprietary data; included with "Unspecified: Reported."

[6]Includes cement manufacture.

[7]Reported and estimated production without a breakdown by end use.

TABLE 5
WYOMING: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY MAJOR USE CATEGORY[1]

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	457	$5,940	$13.01
Plaster and gunite sands	168	896	5.33
Asphaltic concrete aggregates and other bituminous mixtures	336	4,220	12.57
Road base and coverings[2]	2,360	17,000	7.20
Fill	193	965	5.00
Snow and ice control	7	148	21.14
Railroad ballast	8	75	9.38
Other miscellaneous uses[3]	374	1,680	4.49
Unspecified:[4]			
Reported	11,600	51,100	4.39
Estimated	1,660	10,100	6.10
Total or average	17,200	92,200	5.36

[1]Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

[2]Includes road and other stabilization, lime.

[3]Includes filtration.

[4]Reported and estimated production without a breakdown by end use.

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TABLE 6
WYOMING: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2009,
BY USE AND DISTRICT[1]

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate (including concrete sand)[2]	W	W	W	W	--	--
Asphaltic concrete aggregates and road base materials[3]	1,290	11,200	1,010	6,930	396	3,020
Fill	141	624	24	216	29	125
Other miscellaneous uses[4]	866	7,320	144	1,350	5	69
Unspecified:[5]						
Reported	3,220	15,200	3,180	16,500	5,240	19,400
Estimated	669	4,230	993	5,920	--	--
Total	6,180	38,600	5,350	31,000	5,670	22,600

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Includes plaster and gunite sands.

[3]Includes road and other stabilization (cement).

[4]Includes filtration, railroad ballast, and snow and ice control.

[5]Reported and estimated production without a breakdown by end use.

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MAP MINERAL SYMBOLS[1]

Abr	Abrasives
Abr	Abrasives plant
Ag	Silver
AgLime	Agricultural lime
Al	Aluminum plant
Au	Gold
B	Borates
Ba	Barite
BC	Ball clay
Be	Beryllium
Be	Beryllium plant
Bent	Bentonite
Br	Bromine
Bx	Bauxite
CaC	Calcium carbonate
Cd	Cadmium (byproduct)
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
Cu	Copper plant
Dia	Diatomite
D-G	Dimension granite
D-Gn	Dimension gneiss
Diam	Diamond
D-L	Dimension limestone
D-M	Dimension marble
D-Q	Dimension quartzite
D-Sc	Dimension schist/onyx
D-Sd	Dimension sandstone
D-Sl	Dimension slate
DS	Dimension stone - undifferentiated
EM	Emery
FA	Ferroalloys plant
FC	Fire clay
Fe	Iron
Fel	Feldspar
FePig	Iron oxide pigments
FePig	Iron oxide pigment plant
Ful	Fullers earth
Gar	Garnet
Gem	Gemstones
Ge	Germanium (byproduct)
Gil	Gilsonite
Gr	Graphite plant
Gr-s	Synthetic graphite plant
GS	Greensand
Gyp	Gypsum
Gyp	Gypsum plant
Gyp-s	Synthetic gypsum
He	Helium
I	Iodine
IS	Industrial sand
K	Potash
Ka	Kaolin
Ky	Kyanite
Leo	Leonardite
Li	Lithium carbonate
Li	Lithium plant
Lime	Lime plant
Lime-c	Lime plant (captive)
Mg	Magnesium metal plant
MgCp	Magnesium compounds
Mica	Mica
Mn	Manganese plant
Mo	Molybdenum
Mo	Molybdenum plant
Mul	Synthetic mullite plant
Nabic	Sodium bicarbonate
NaC	Sodium carbonate (soda ash)
NaS	Sodium sulfate
Nb/Ta	Niobium (columbium) and tantalum plant
O	Olivine
Opal	Precious opal
P	Phosphate rock
Pb	Lead
Pb	Lead plant

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[1]The maps in this report are intended to show by mineral symbols the location of significant nonfuel mineral mining or processing operations within each State in 2009. (An underlined symbol indicates a plant.) The symbols are not intended to show the location of every mine, quarry, and operation. Because there are about 13,000 nonfuel mineral operations in the United States, publication space limitations preclude the inclusion of a clear and legible map indicating all active operations. In the case of aggregates (construction sand and gravel and crushed stone) a single symbol may represent all operations within a county. The U.S. Geological Survey's National Atlas, however, provides such data on the Internet at http://www.nationalatlas.gov. In most cases, a mineral symbol represents production of a significant quantity of a mineral. A symbol can indicate the location of a major mineral mining or processing operation, the location of a concentration of mining operations for a specific mineral, or the location of significant operations within a county. In some cases, however, a symbol may indicate a small operation that is significant because the mineral is uncommon or unique within the State or the Nation. Where there is an extensive geographic area with a significant concentration of similar operations, a dashed line defines the area.

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Pd	Palladium
Peat	Peat
Per	Perlite
Per	Perlite plant
Pt	Platinum
Pum	Pumice and pumicite
Pyrp	Pyrophyllite
RE	Rare earths plant
SaCp	Saline compounds
Salt	Salt
SG	Construction sand and gravel
Sh	Shale
Shell	Shell
Si	Silicon metal plant
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
Steel	Steel plant
Talc	Talc
Ti	Titanium minerals
TiMet	Titanium metal plant
TiPig	Titanium dioxide pigment plant
Tri	Tripoli
U	Uranium
V	Vanadium
V	Vanadium plant
Ver	Vermiculite
Ver	Vermiculite plant
Volc	Volcanic cinder
W	Tungsten plant
Wol	Wollastonite
Zeo	Zeolites
Zn	Zinc
Zn	Zinc plant
Zr	Zircon
Zr	Zirconium plant

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